LEARNING AGENTS LABORATORY

User Manual

Getting Started with Disciple-HPKB

USER MANUAL

Getting Started with Disciple-HPKB

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Chapter

1

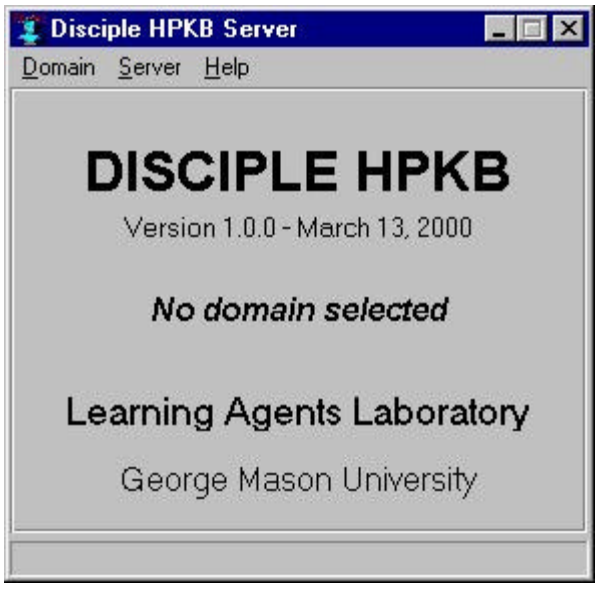
Starting Disciple HPKB

Disciple HPKB system has a client-server architecture. The server is a Common Lisp program and is the brain of the system. The client is a JAVA program and is responsible for the interaction with the user. To start Disciple HPKB you need first to start the server, then start the client and finally connect the client to the server.

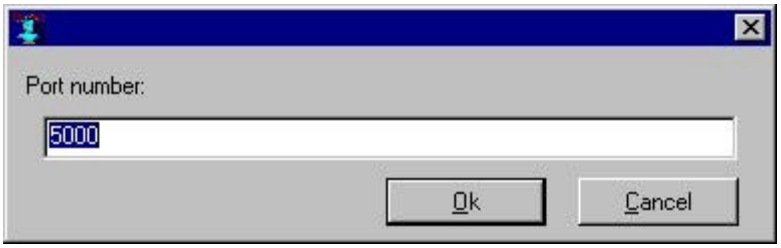
To start Disciple HPKB you must perform the following operations:

?? Double-click the "Disciple-Server.exe" file that is in the subdirectory Bin of Disciple directory to start the Server.

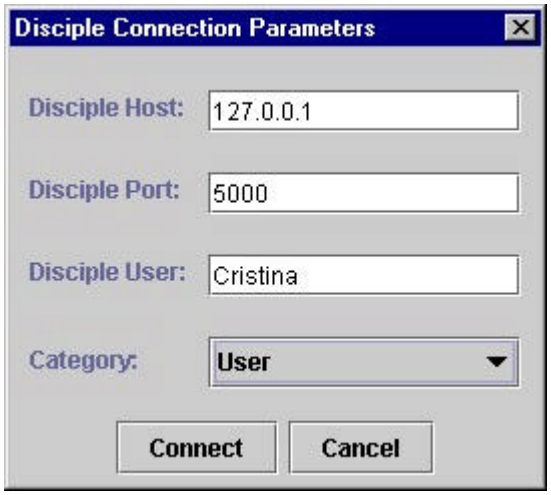
?? In the "Disciple Server" window that appears, click on the "Server / Start Server" menu (to start the Lisp Server).



?? In the window that appears select a port number from 5000 up, and click Ok. (At this point you can minimize the "Allegro CL Enterprise" window.)



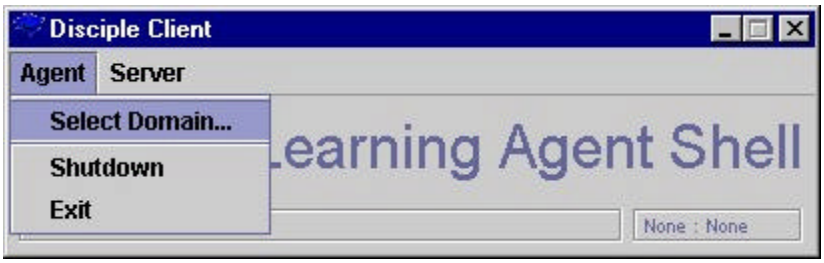
?? Double click on "JDisciple," the shortcut of Disciple-HPKB interface. The "Disciple Connection Parameters" window will be displayed. You may write your name in the "Disciple User" pane. Then click on the "Connect" button to start the Java Server.



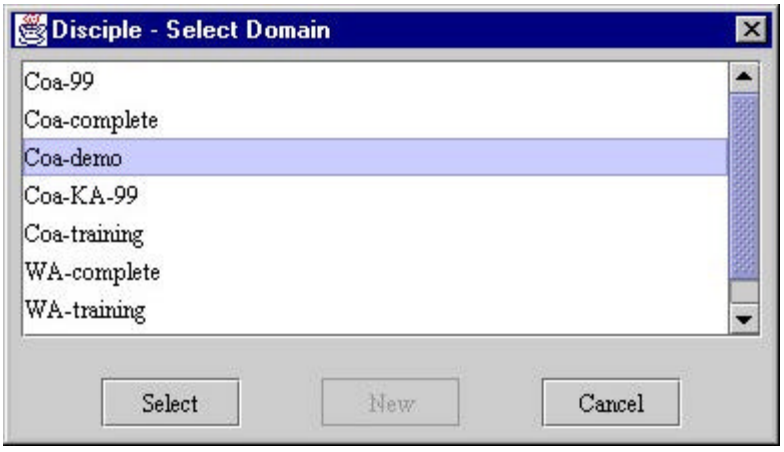
Chapter 2

Selecting HPKB Domain

In the "Disciple Client" window, click on the "Agent / Select Domain" menu.



The "Select Domain" window will be displayed.



Click on "COA-demo" and then on "Select". This will load the knowledge base that contains a "complete" ontology of objects, object features and task features, but only the tasks and the rules for critiquing a course of action with respect to the principle of offensive and the principle of surprise. During this demonstration we will show you how to teach Disciple to critique a course of action with respect to the principle of security.

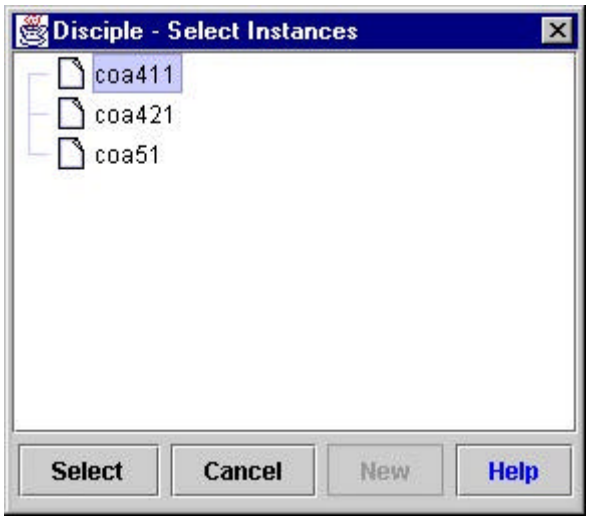
Chapter

3

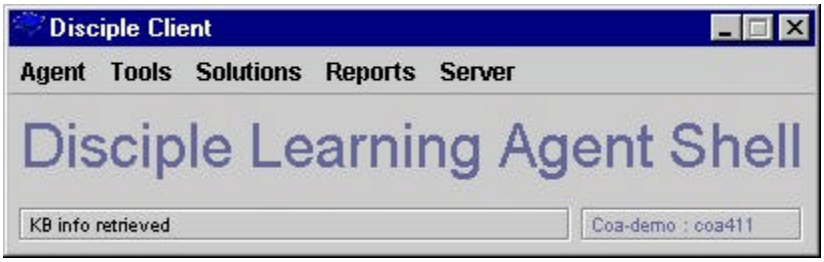
Loading a Problem Description into the Knowledge Base

The KB loaded contains general COA knowledge, but no description of any particular COA. To critique a particular COA we would need to load into the KB the description of that COA.

In the "Disciple Client" window click on the "Agent / Load Instances" menu. The "Disciple Select Instances" window will be displayed. Click on "coa411" and then on "Select".



After these operations, the lower left of the "Disciple Client" window will display the message "KB info retrieved" and the lower right will display the message "COA-demo: coa411".

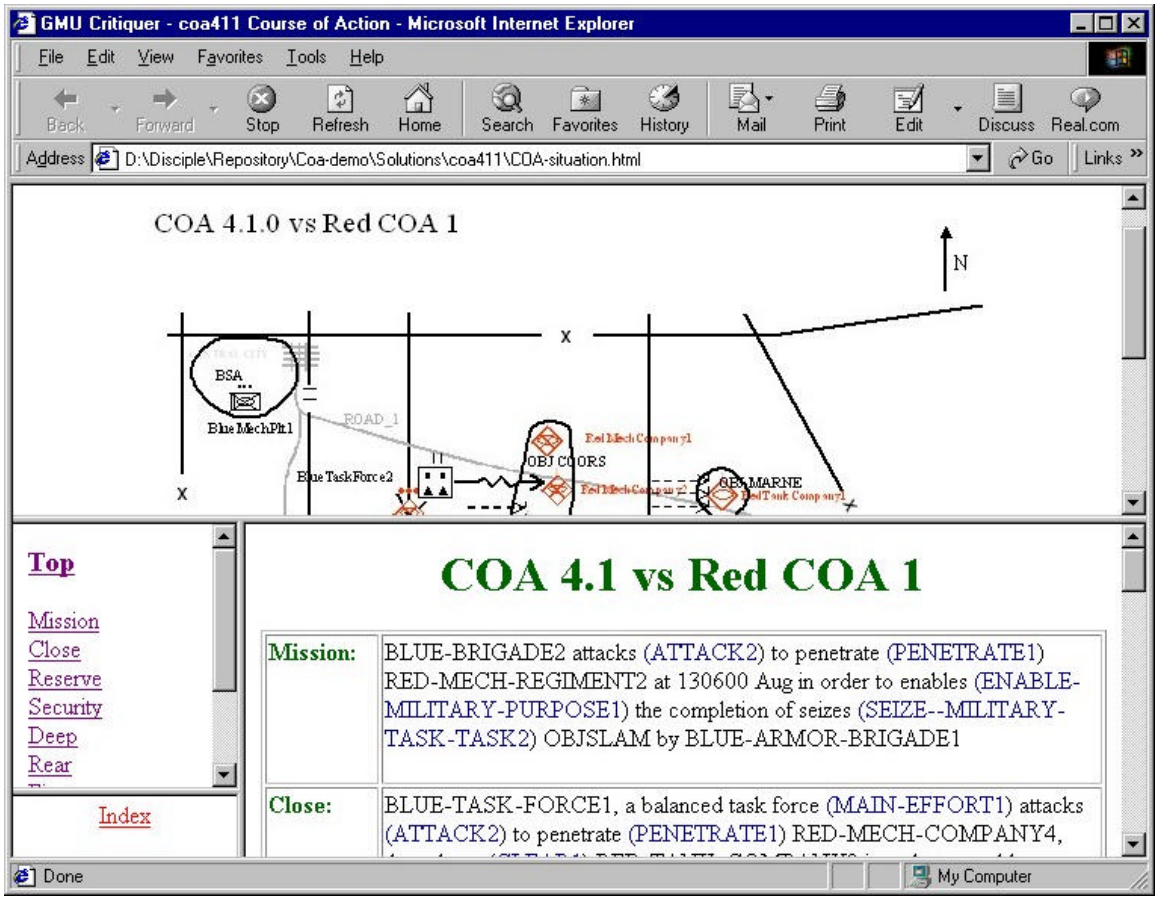

Disciple Client
Agent
Tools
Solutions
Reports
Server
Disciple Learning Agent Shell
KB info retrieved
Coa-demo : coa411

Chapter

4

Viewing the Input Problem

To view coa411 use the "Disciple Client" window. From the "Solutions" menu select "Input Problem Viewer". An Internet Explorer window will appear, containing the description of coa411. The description contains two pieces of information, a sketch (in the top part of the window) and a statement (in the bottom part of the window).



The COA sketch is a graphical depiction of the course of action. It includes enough of the high level structure and maneuver aspects of the plan to show how the actions of each unit fit together to accomplish the overall purpose, while omitting much of the execution detail that will be included in the eventual operational plan. The three primary elements included in the COA sketch are: control measures which limit and control interactions between units; unit graphics that depict known, initial locations and make up of friendly and enemy units; and mission graphics that depict actions and tasks assigned to friendly units. The COA sketch is drawn using a palette-based sketching utility. The sketch in the figure above for example, includes a square labeled Blue Task Force 2. The symbols indicate that this is a battalion sized task force consisting of two tank units and two infantry units, and the task force is assigned the task of conducting a fixing attack against enemy units located in the vicinity of Objective Coors. The solid lines above and below Blue Task Force 2 mark the unit's northern and southern boundaries which it may not cross, or shoot across, without asking permission.

The COA statement clearly explains what the units in a course of action will do to accomplish the assigned mission. The text of a COA statement includes a description of the mission and desired end state, as well as standard elements that describe purposes, operations, tasks, forms of maneuvers, units, and resources to be used in the COA. The COA statement is expressed in a restricted but expressive subset of English as described in various military manuals. The example above depicts two of the standard, required elements of the COA text; Mission and Close Battle. The "Mission" section of the COA text describes the overall mission of the unit preparing the COA. In this case, the mission of Blue Brigade 2 is to attack to penetrate Red Mechanized Infantry Regiment 2 with the purpose of enabling another unit, Blue Armor Brigade 1, to seize an objective call Objective SLAM. Thus, the mission segment of the COA text tells the unit exactly what is to be accomplished (attack), how it is to be accomplished in this particular COA (penetrate), and why the mission is to be performed (enable another attack to succeed).

The COA sketch and statement are translated into a formal representation in the CycL language by a fusion engine developed by Teknowledge and AIAI. This fusion engine is not part of the Disciple system. Disciple contains a problem mediator that receives as input a text file containing the CycL representation of a coa and translates it into an instance file in the Disciple representation. When we loaded coa411 we loaded directly this instance file.

Notice that the coa statement contains some names in brackets, in blue, such as: “BLUE-BRIGADE2 attacks (ATTACK2) to penetrate (PENETRATE1) …” These names are the unique names given to various elements of the COA during the translation from the external form of the coa to its internal form. Thus, ATTACK2 refers to the attacks action of BLUE-BRIGADE2 (and its main effort BLUE-TASK-FORCE1), and ATTACK3 refers to the attack of BLUE-TASK-FORCE2.

One can view the internal representation of coa411 in Disciple’s KB by using the browsers and viewers of Disciple, as will be illustrated latter.

We can keep the Internet Explorer window opened for future references, or we could close it at this point.

Chapter

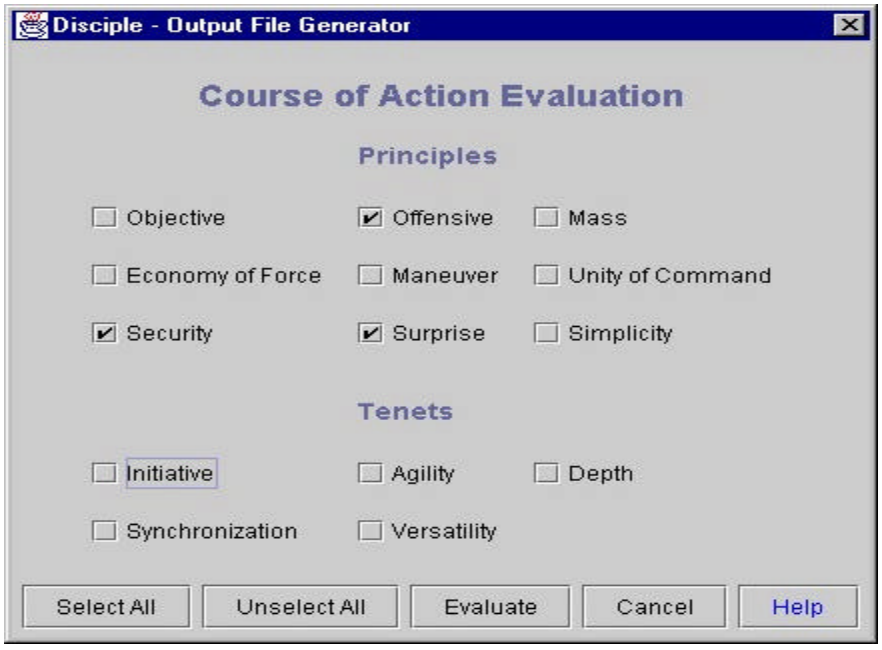
5

Using Disciple as a Problem Solver

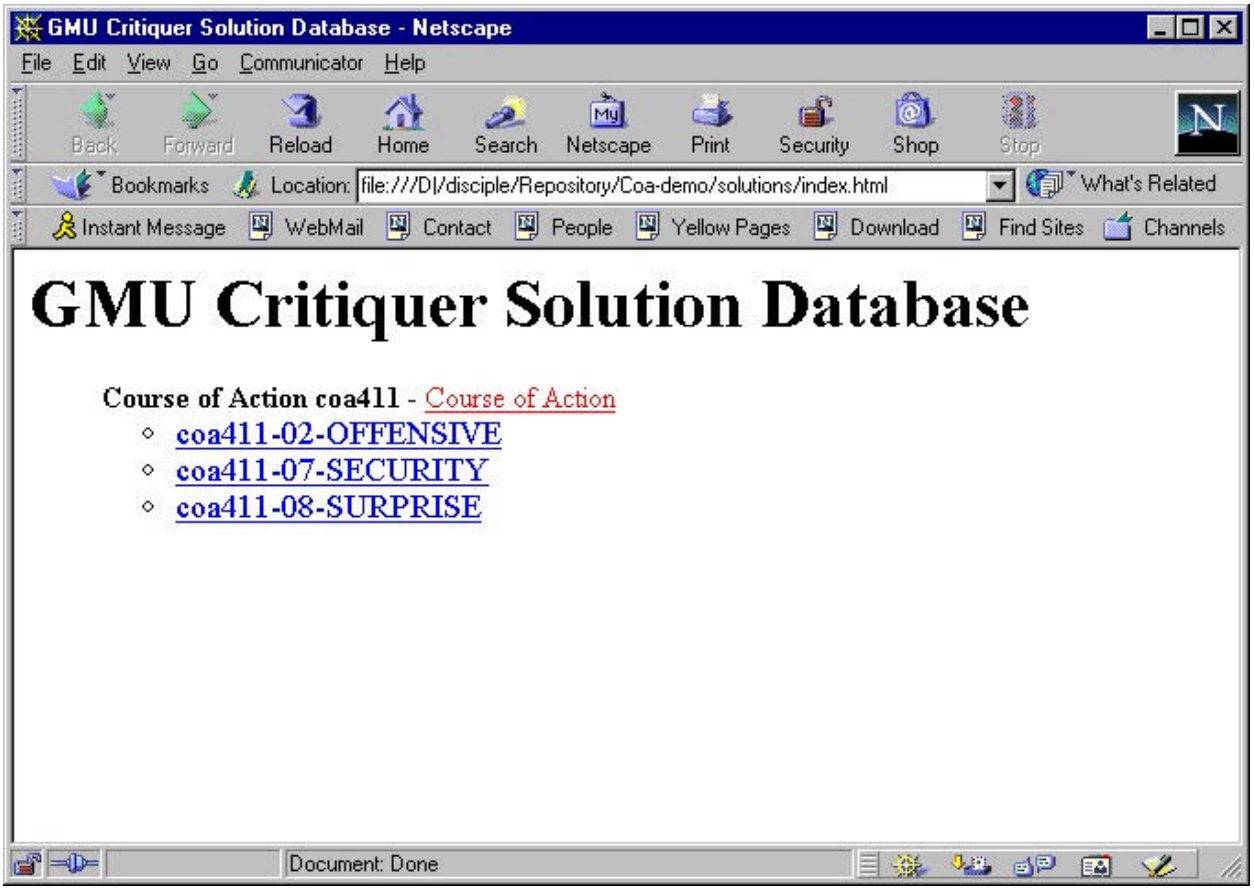
Now we can see how Disciple can critique coa411 using the autonomous problem solver.

Use the "Disciple Client" window. Point to the "Solutions" menu, and from the menu that appears select "Generate Solutions".

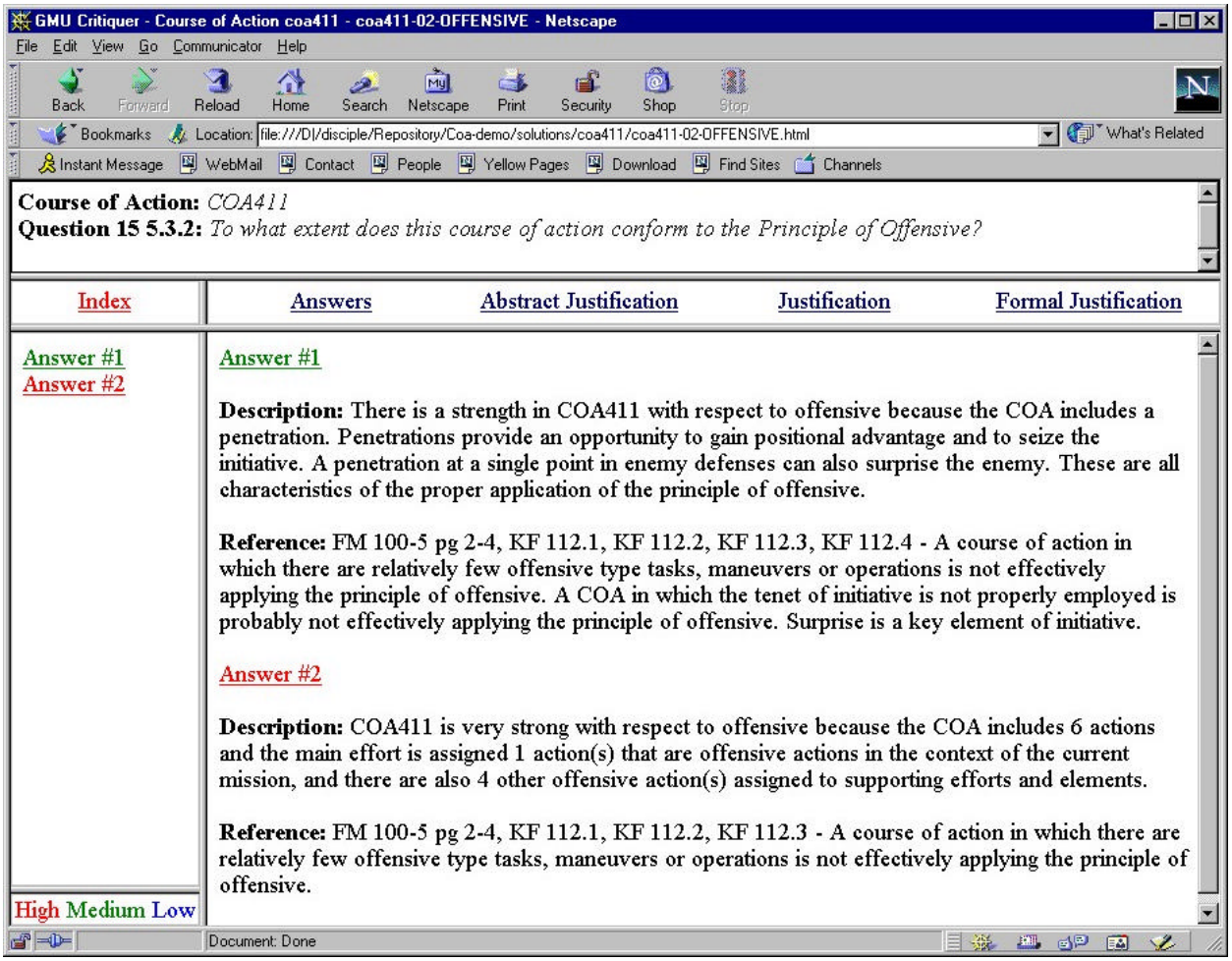
In the "Disciple – Output File Generator" window that is displayed, select "Offensive", "Security", and "Surprise". Then click on "Evaluate".



An Internet Explorer window will show the solutions generated for these three principles.


GMU Critiquer Solution Database - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/index.html What's Related
Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
GMU Critiquer Solution Database
Course of Action coa411 - Course of Action
coa411-02-OFFENSIVE
coa411-07-SECURITY
coa411-08-SURPRISE
Document: Done

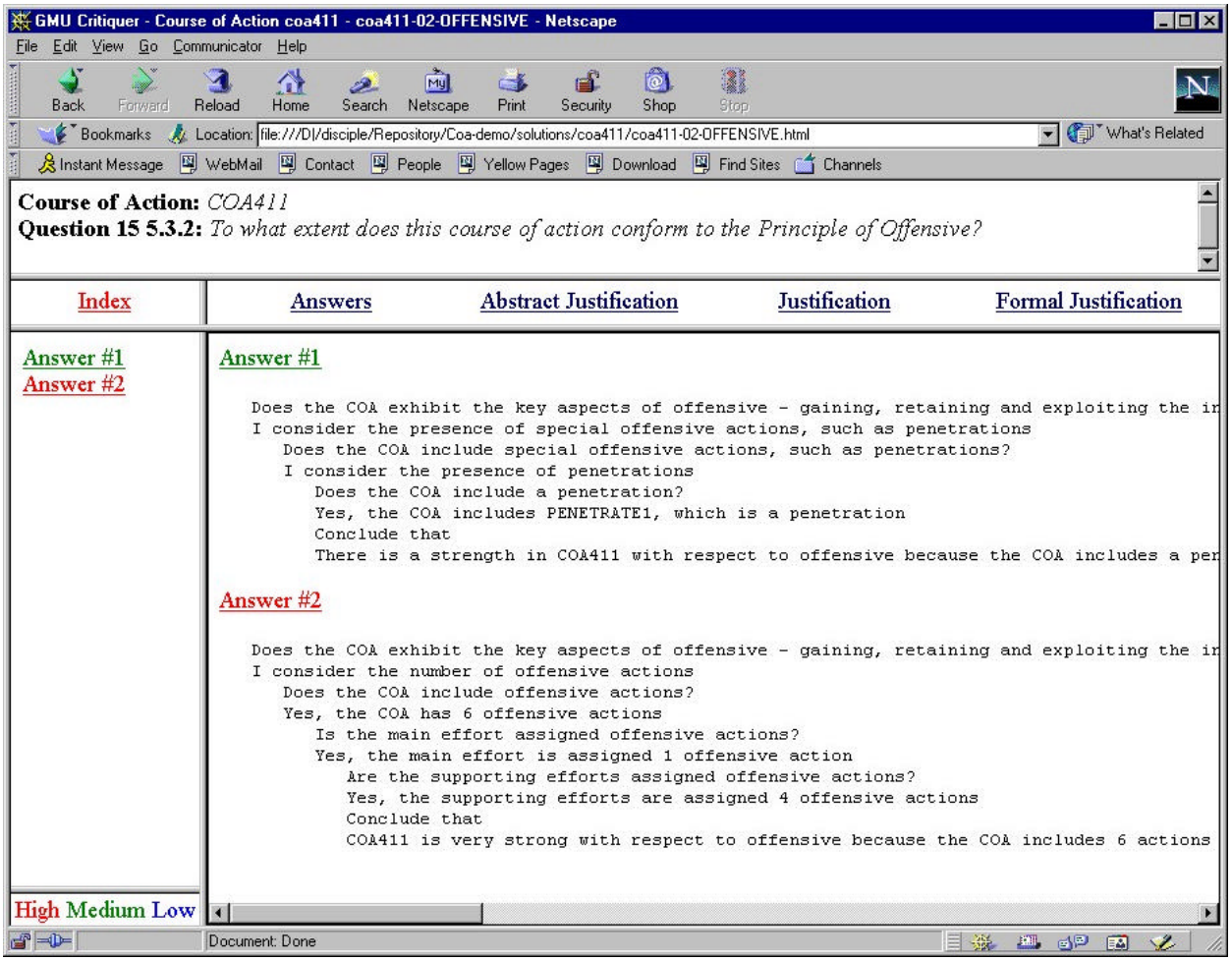
Let us click on "COA411-02-OFFENSIVE". A window will appear showing two critiques of coa411 with respect to the principle of offensive.


GMU Critiquer - Course of Action coa411 - coa411-02-OFFENSIVE - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/coa411/coa411-02-OFFENSIVE.html What's Related
Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
Course of Action: COA411
Question 15 5.3.2: To what extent does this course of action conform to the Principle of Offensive?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
High Medium Low
Answer #1
Description: There is a strength in COA411 with respect to offensive because the COA includes a penetration. Penetrations provide an opportunity to gain positional advantage and to seize the initiative. A penetration at a single point in enemy defenses can also surprise the enemy. These are all characteristics of the proper application of the principle of offensive.
Reference: FM 100-5 pg 2-4, KF 112.1, KF 112.2, KF 112.3, KF 112.4 - A course of action in which there are relatively few offensive type tasks, maneuvers or operations is not effectively applying the principle of offensive. A COA in which the tenet of initiative is not properly employed is probably not effectively applying the principle of offensive. Surprise is a key element of initiative.
Answer #2
Description: COA411 is very strong with respect to offensive because the COA includes 6 actions and the main effort is assigned 1 action(s) that are offensive actions in the context of the current mission, and there are also 4 other offensive action(s) assigned to supporting efforts and elements.
Reference: FM 100-5 pg 2-4, KF 112.1, KF 112.2, KF 112.3 - A course of action in which there are relatively few offensive type tasks, maneuvers or operations is not effectively applying the principle of offensive.
Document: Done

The answers are color-coded to indicate the importance of the generated critiques ("High", "Medium", or "Low").

Each answer consists of two pieces of information: the answer itself, and references to manuals and predefined knowledge fragments that support the answer.

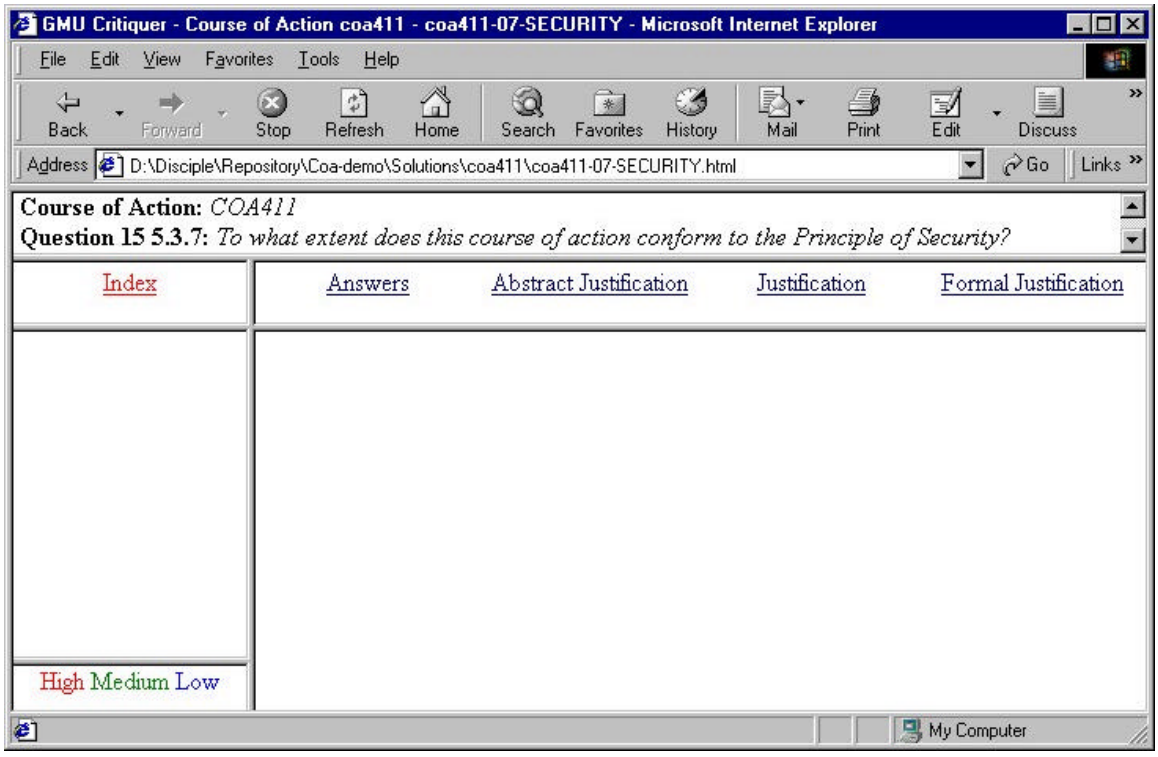
Click on "Abstract Justification" to see how Disciple has generated each critique.


GMU Critiquer - Course of Action coa411 - coa411-02-OFFENSIVE - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/coa411/coa411-02-OFFENSIVE.html What's Related
Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
Course of Action: COA411
Question 15 5.3.2: To what extent does this course of action conform to the Principle of Offensive?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
Answer #1
Does the COA exhibit the key aspects of offensive - gaining, retaining and exploiting the in
I consider the presence of special offensive actions, such as penetrations
Does the COA include special offensive actions, such as penetrations?
I consider the presence of penetrations
Does the COA include a penetration?
Yes, the COA includes PENETRATE1, which is a penetration
Conclude that
There is a strength in COA411 with respect to offensive because the COA includes a per
Answer #2
Does the COA exhibit the key aspects of offensive - gaining, retaining and exploiting the in
I consider the number of offensive actions
Does the COA include offensive actions?
Yes, the COA has 6 offensive actions
Is the main effort assigned offensive actions?
Yes, the main effort is assigned 1 offensive action
Are the supporting efforts assigned offensive actions?
Yes, the supporting efforts are assigned 4 offensive actions
Conclude that
COA411 is very strong with respect to offensive because the COA includes 6 actions
High Medium Low
Document: Done

Clicking on "Justification" and on "Formal Justification" will provide more details on the justification.

Click on "Index" to return to the window with all the solutions.

Click on "COA411-08-SECURITY" to view the critique of coa411 with respect to the principle of security. Disciple has not been taught how to critique a coa with respect to this principle. Therefore no critique is generated.


GMU Critiquer - Course of Action coa411 - coa411-07-SECURITY - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss
Address D:\Disciple\Repository\Coa-demo\Solutions\coa411\coa411-07-SECURITY.html
Go Links
Course of Action: COA411
Question 15 5.3.7: To what extent does this course of action conform to the Principle of Security?
Index
Answers
Abstract Justification
Justification
Formal Justification
High Medium Low
My Computer

We will demonstrate how Disciple could be taught to perform such a critique.

You can now close the Internet Explorer window that displays the solutions.

Chapter

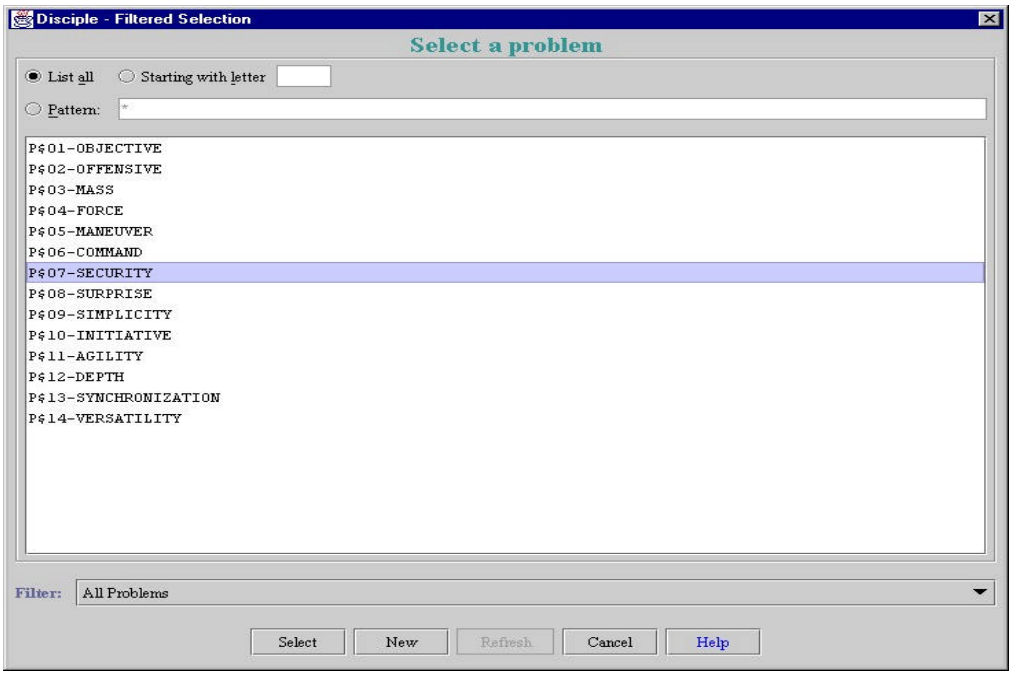
6

Teaching Disciple to Solve Problems

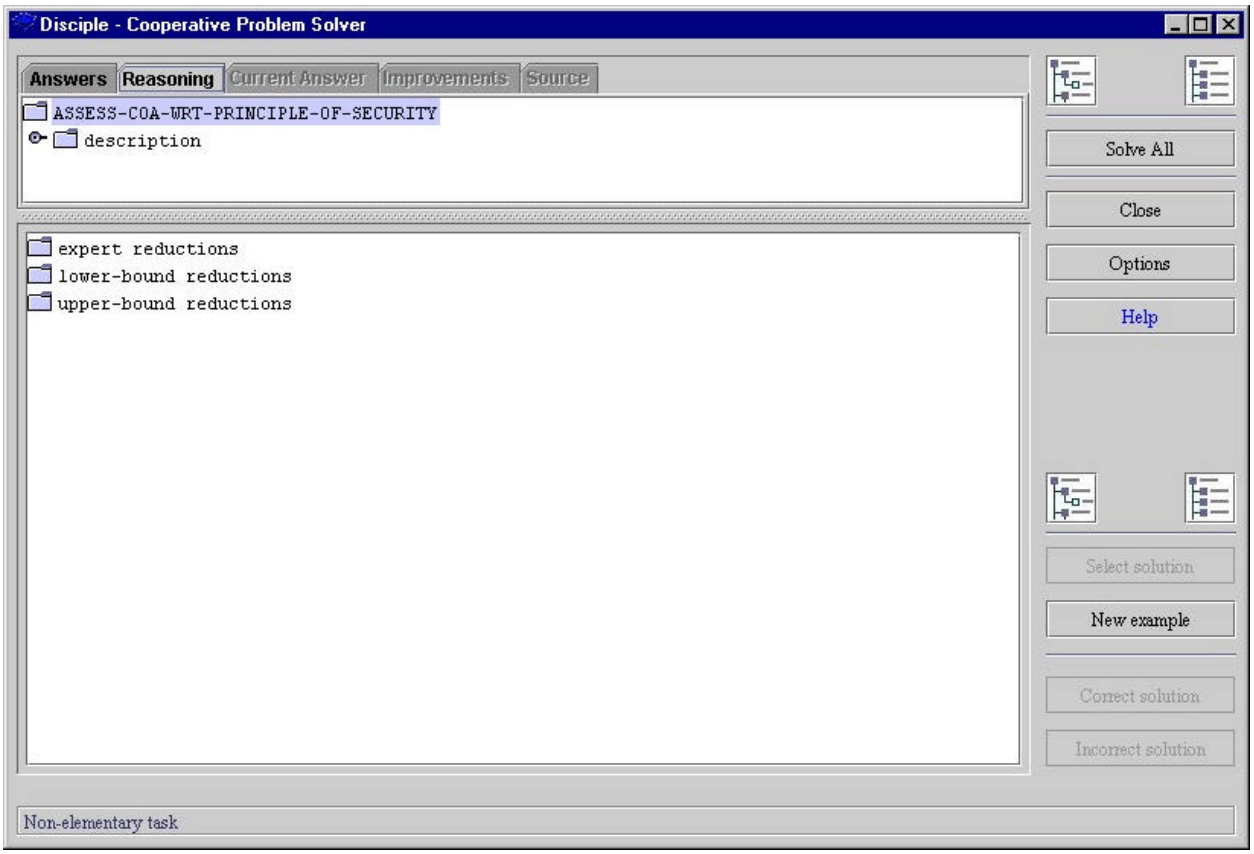
We will now teach Disciple to critique COAs with respect to the Principle of Security.

6.1 Interacting with the Cooperative Problem Solver to critique coa411

We first need to invoke the Cooperative Problem Solver. In the "Disciple Client" window, from the "Tools" menu select "Problem Solver". A window will appear that will allow us to select the problem we would like to solve. Select "List all" and Disciple will list 14 predefined problems, one for each principle and tenet.



In the displayed list click on "P$07-SECURITY" and then on the "Select" button. This will invoke the Cooperative problem solver with the predefined problem: "ASSESS-COA-WRT-PRINCIPLE-OF-SECURITY".



Clicking on "description" in the top pane allows us to see the complete description of the input problem. The same effect is achieved by clicking on the tree-like buttons in the right hand side of the window.

The problem solver tried to reduce this task by applying the task reduction rules from its knowledge base. However, there is no rule in the KB to reduce the above problem. Therefore no solution is listed in the bottom pane of the window.

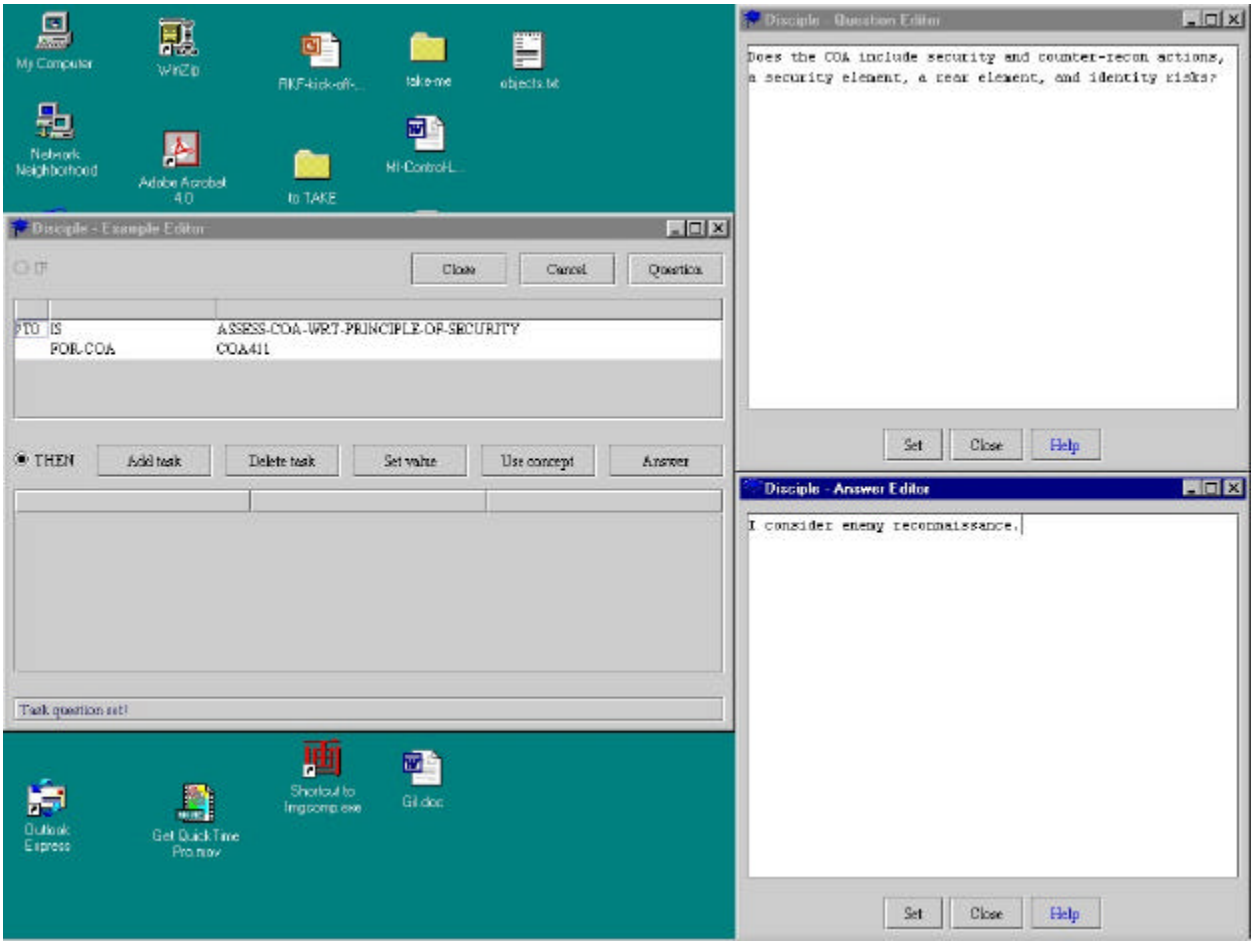
Notice that the bottom pane indicates three types of potential solutions.

"Expert-reductions" are reductions that have been provided by us (i.e. the human expert) in previous steps. They are the most certain. "Lower-bound reductions" and "Upper-bound reductions" are generated by Disciple by using some previously learned rules, with the "lower-bound reductions" being more certain than the "upper-bound reductions".

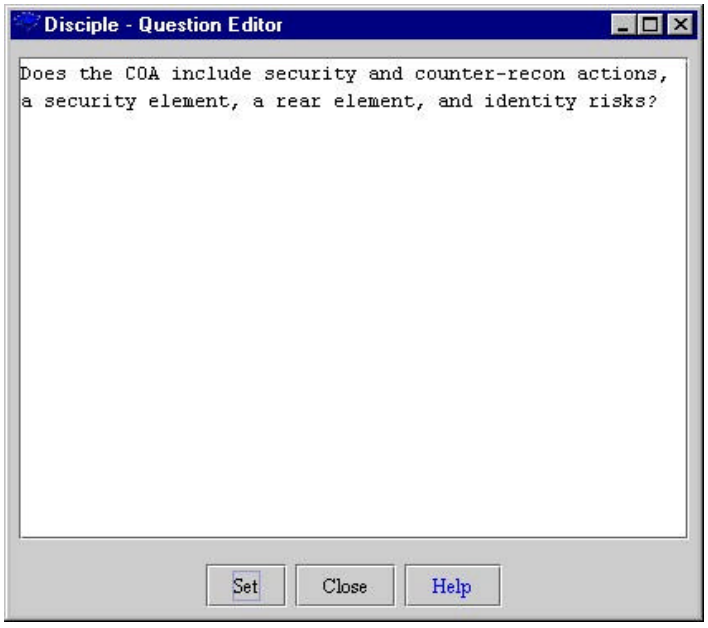
6.1.1 Defining a task reduction with the Example Editor

Because no reduction was proposed by Disciple, we will need to provide ourselves a reduction. Click on the "New example" button, in the right hand side of the "Cooperative Problem Solving" window. This invokes the Example Editor that the expert needs to use in order to define the reduction of the current task.

An example consists of a task, a question, an answer to the question, and a subtask. Because the top level task was already defined in the Disciple's knowledge base, Disciple fills in the task to be reduced in the top pane of the "Disciple - Example Editor".

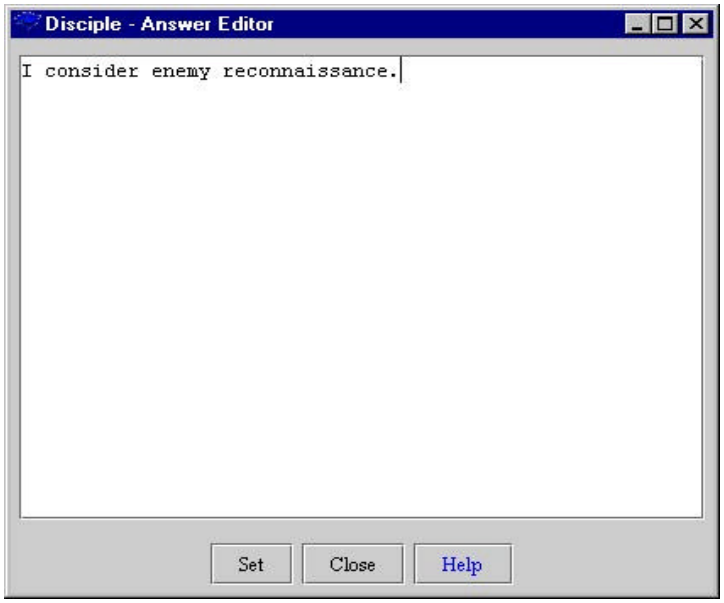


It also fills in the question in the "Disciple - Question Editor" window.


Disciple - Question Editor
Does the COA include security and counter-recon actions,
a security element, a rear element, and identity risks?
Set
Close
Help

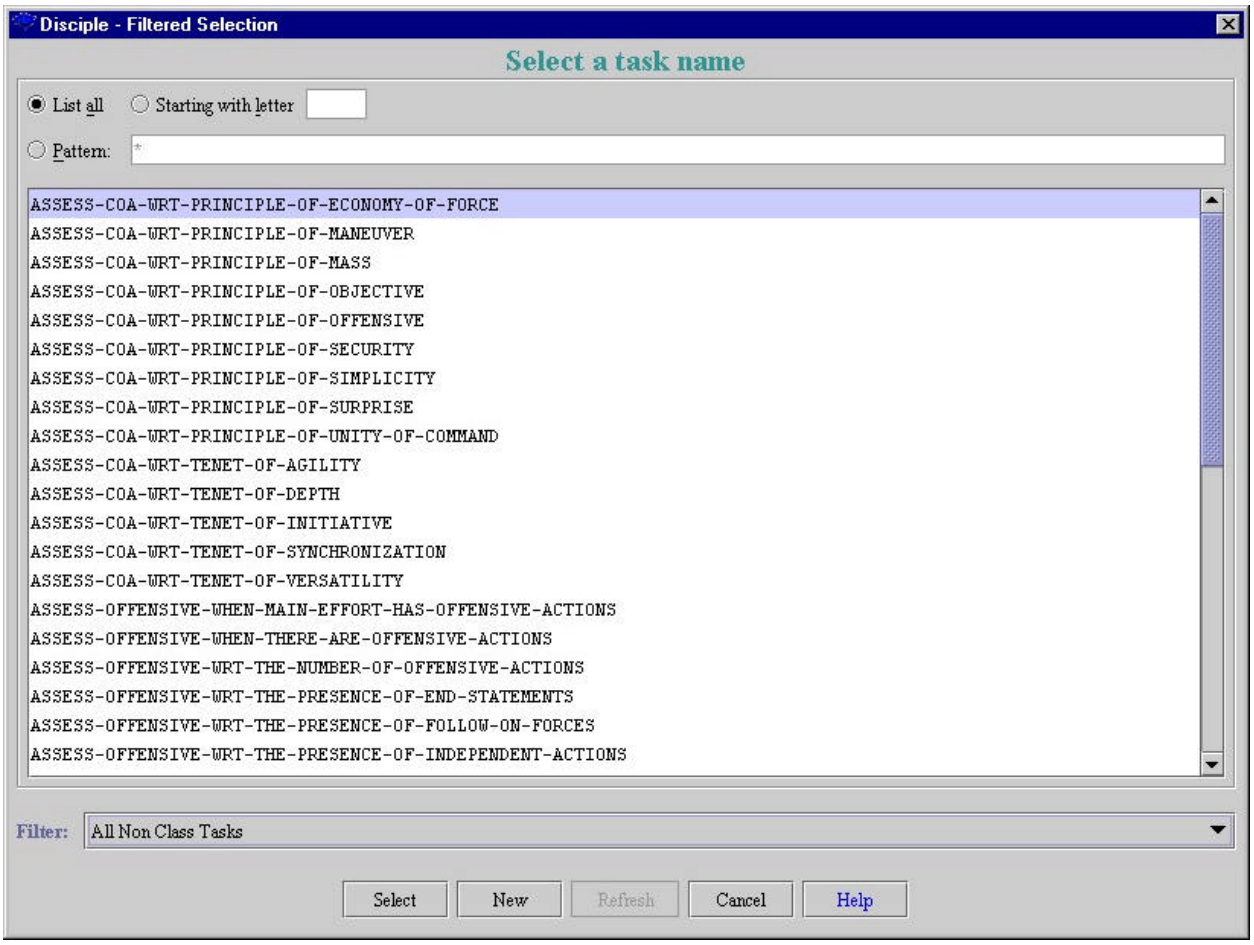
We need to provide the answer to the question and the subtask derived from this answer. The task is to assess COA411 with respect to the Principle of Security. The question has the purpose of enumerating the various aspects that one needs to consider with respect to the Principle of Security, and guides us to break the top level task into several subtasks, each corresponding to one of the identified aspects. One of these aspects is the enemy reconnaissance, and the corresponding subtask is to assess security of COA411 with respect to countering enemy reconnaissance.

You could therefore write the answer "I consider enemy reconnaissance" in the Answer editor window. Notice that this is a natural language phrase. You can rephrase it any way you wish.



Then you have to fill in the subtask of assessing security of COA411 with respect to countering enemy reconnaissance, in the bottom pane of the "Disciple - Example Editor" window.

Click on "Add task" button. This opens a task selector window that will allow you to display the existing tasks from the KB and to select the one to be included in the "Disciple -Example Editor" window.



The "Filter" at the bottom of the "Filtered Selection" window allows you to specify the class of tasks from which you will display the tasks. "All related tasks" means all the tasks related to the task in the top pane of the "Example Editor" window. In this case this means all the tasks related to the principle of security. "All Non Class Tasks" means all the non-class tasks in the knowledge base.

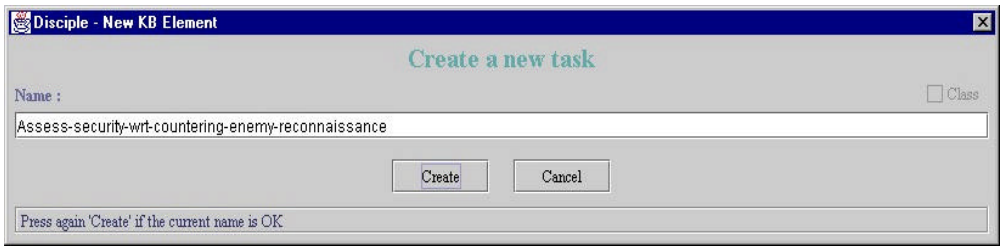
The buttons at the top of the "Filtered Selection" window perform an additional filtering of the tasks to be displayed.

The only task related to security that the KB contains is the one from the top pane of the "Example Editor" window. Therefore you need to define the subtask to be included in the current example.

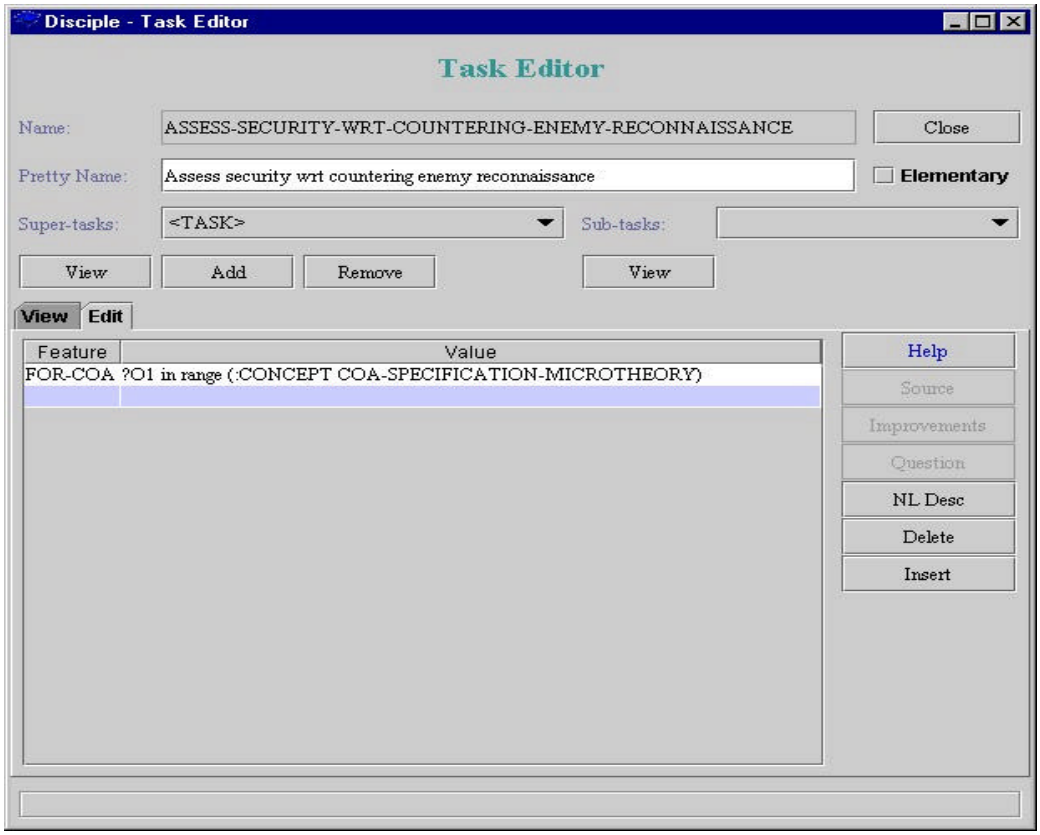
6.1.1.1 Defining a new task with the Task Editor

Click on the "New" button in the "Filtered Selection" window. This opens the "New KB Element" window where we have to provide the name of the new task.

Write "Assess security wrt countering enemy reconnaissance" or a similar phrase. Then click on the "Create" button. Disciple will transform this phrase into a task name by replacing the blanks with "-". Then it will give you a chance to make any corrections you wish. Click again on "Create".



The "Task Editor" window will be opened with a partial description already hypothesized by Disciple. To fill in this partial description, Disciple uses the assumption that the task in the THEN part of an example will have all the features of the task in the IF part.



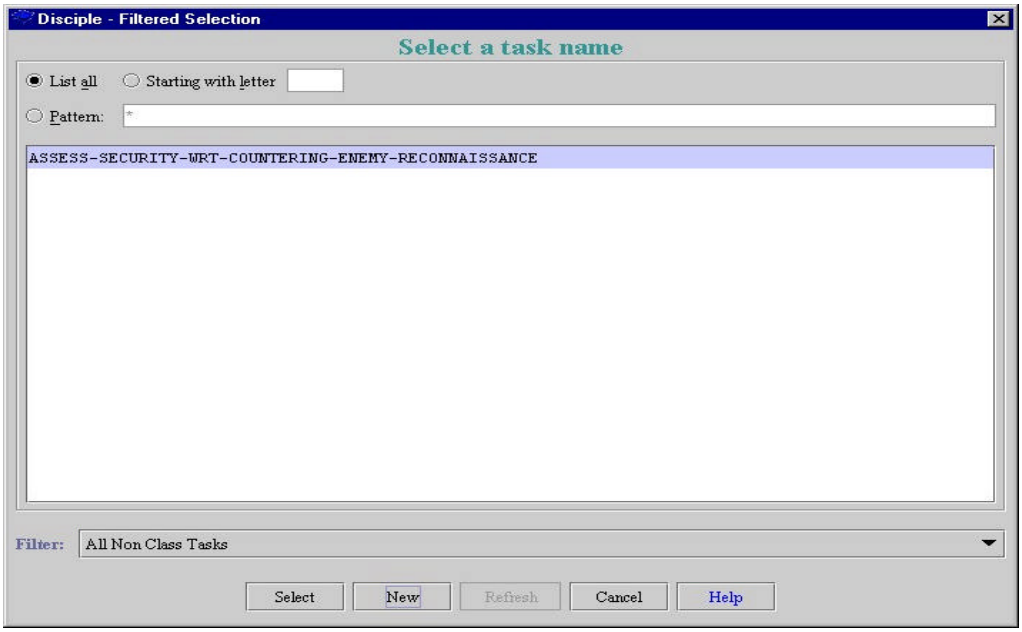
You can modify and complete the description of the task by deleting task features, providing additional task features, a pretty name for the task, and a natural language phrase for the task.

In this case the task is complete enough and you do not need to add anything. Just click on "Close". The Task Editor will introduce this new task in the KB of Disciple.

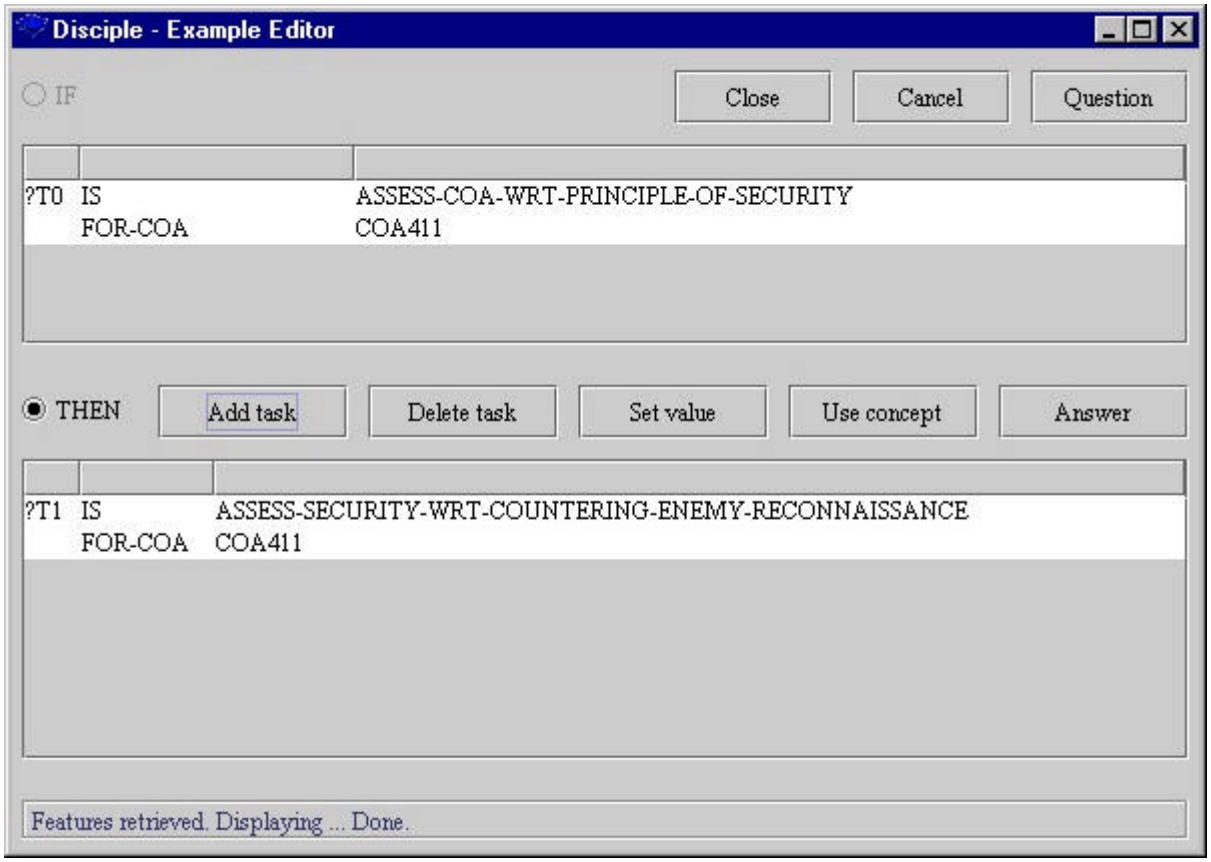
This ends the definition of the new task.

Now we need to proceed with completing the reduction in the Example Editor.

The new task is displayed and selected in the "Filtered Selection" window. Click on "Select".



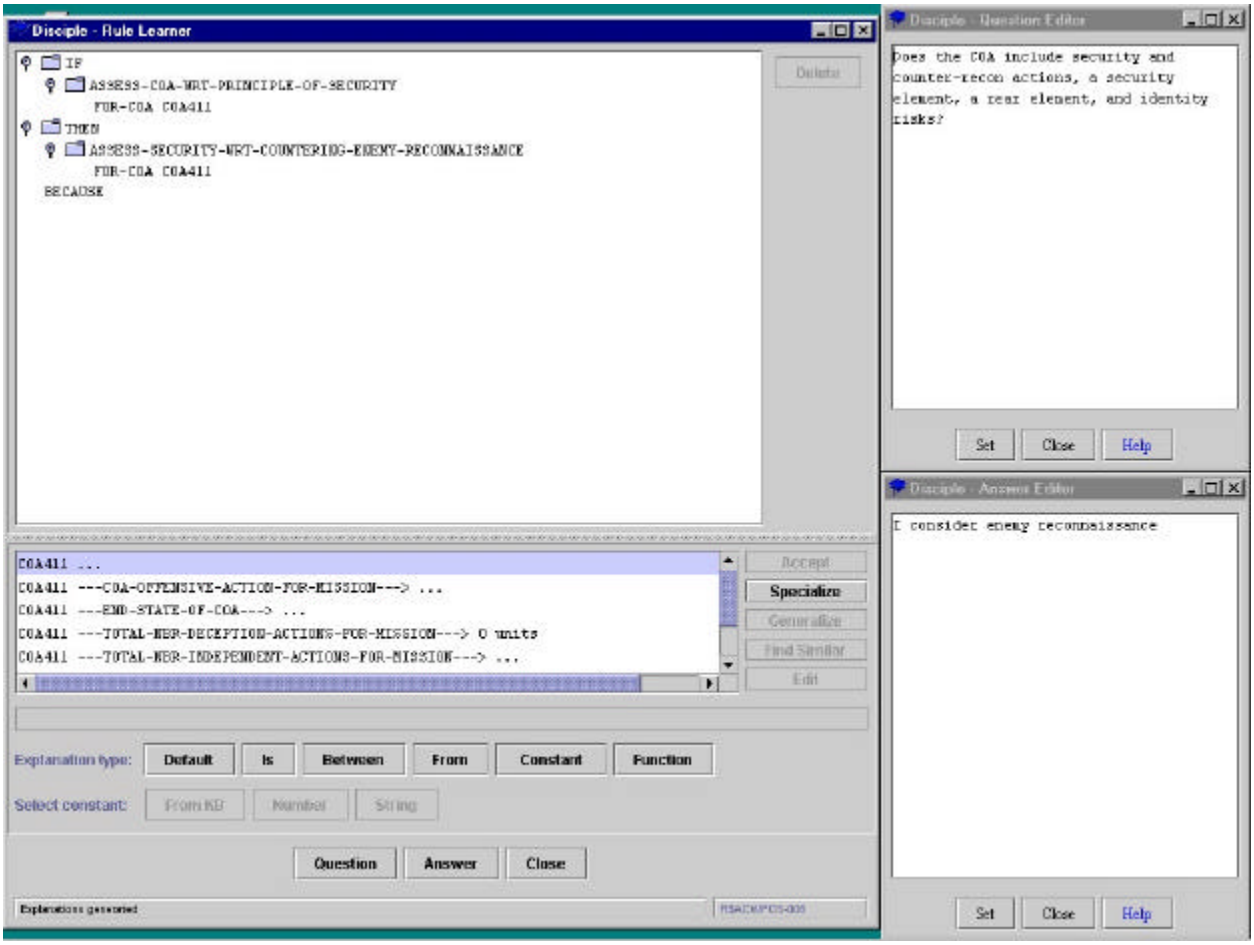
The task will be included in the bottom pane of the "Example Editor" window. Notice that Disciple also fills in the value of the "FOR-COA" feature by using the assumption that if a task feature appears in both sides of an example, its value will be the same. You can modify the value but this is not necessary in this case.



Now the task reduction has been completely defined and you can click on "Close".

6.1.2 Interacting with the Rule Learner

After the example has been defined, the Rule Learner is automatically invoked. Disciple will learn a general task reduction rule from the provided task example.



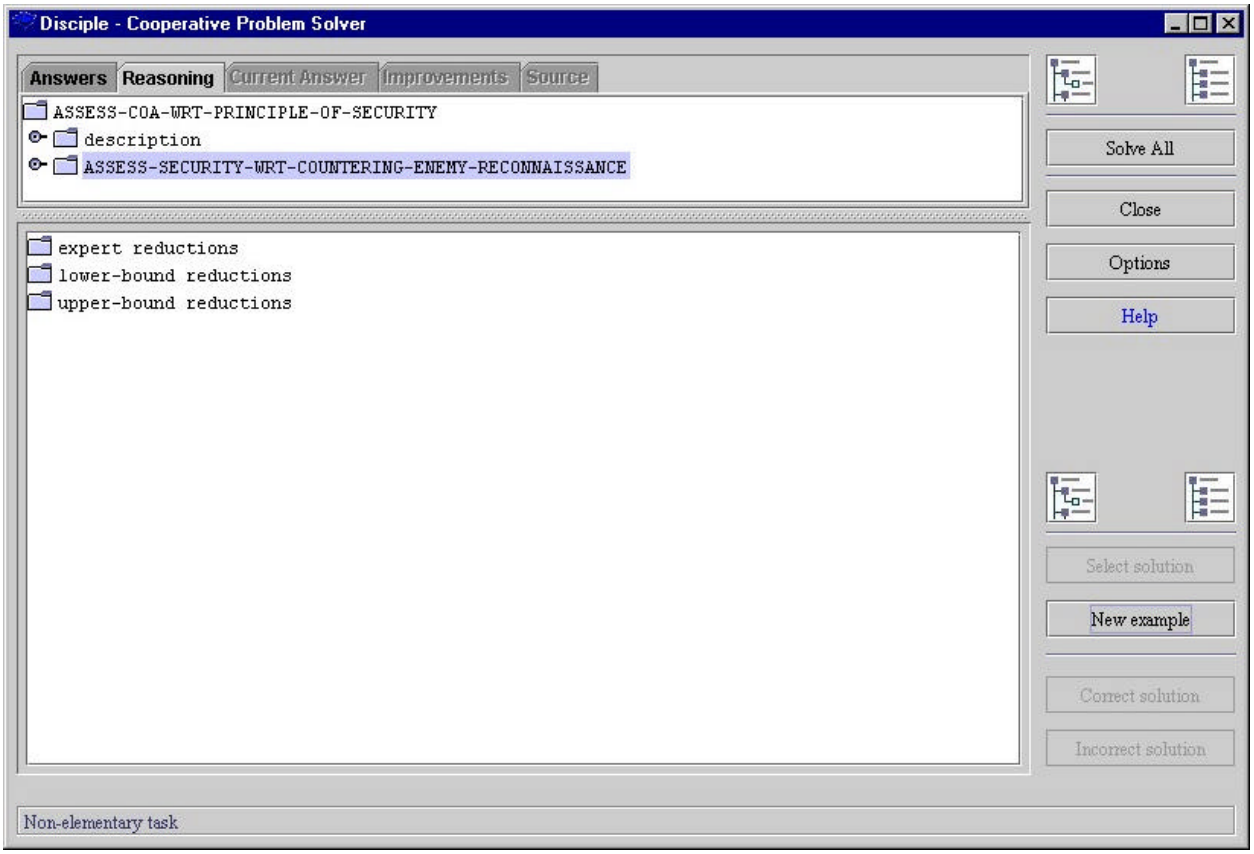
The top pane of the "Rule Learner" window shows the example reduction.

At the top right of this window you can see the question that you considered in order to assess the coa wrt the principle of security. At the bottom right you can see your answer.

In the bottom pane of the "Rule Learner" window Disciple displayed some potential explanations of why and when we want to perform the reduction from the top pane. This is, however, an unconditional reduction. That is, any time I want to assess coa411 wrt the principle of security, I want to reduce this task to that of assessing coa411 wrt countering enemy reconnaissance. Therefore no explanation is necessary, in this case.

We will discuss the other capabilities of the Rule Learner later on in the demo. Now just click on "Close".

At this point Disciple will generate a rule based on this example, will introduce it in the KB, and will return to the Cooperative Problem Solver.



Notice that the "Cooperative Problem Solver" window shows the reduction indicated by us in the top pane. Notice also that it cannot propose any reduction of the bottom level task. Therefore we need again to provide the reduction by clicking on "New example". This will lead us to the same sequence of operations as before.

6.1.3 Defining a task reduction with the Example Editor

The Example Editor is invoked and the top pane displays the current task to be reduced.

We need to assess security of coa411 wrt countering enemy reconnaissance.

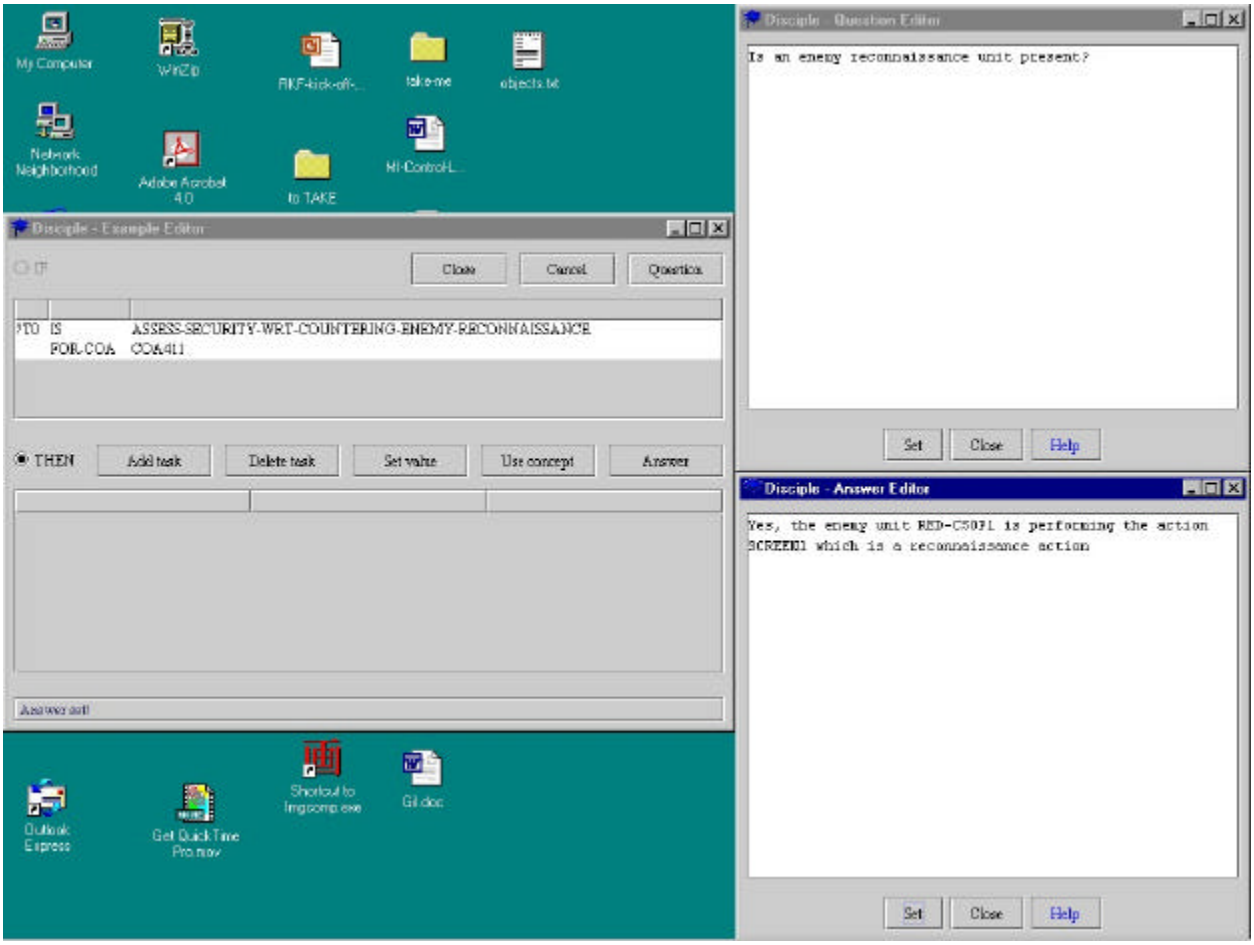
Is an enemy reconnaissance unit present?

Yes, the enemy unit RED-CSOP1 is performing the action SCREEN1 which is a reconnaissance action.

Then I need to assess security when enemy recon is present.

This analysis clarifies the reduction that we want to be performed in this situation.

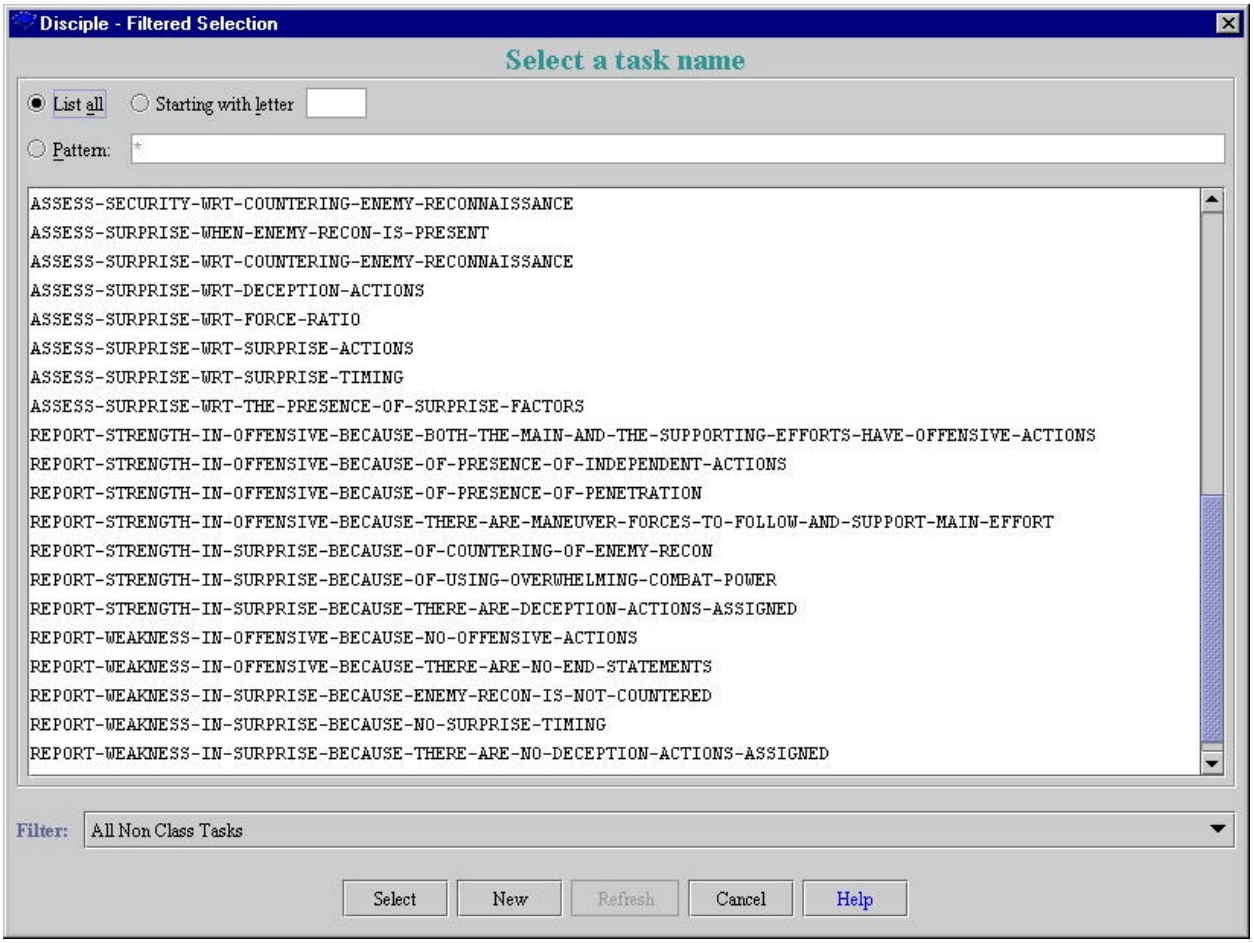
Introduce the question and the answer in the corresponding windows.



Click on “Add Task”.

The “Select a task name” window will be displayed by the “Filtered Selection” tool.

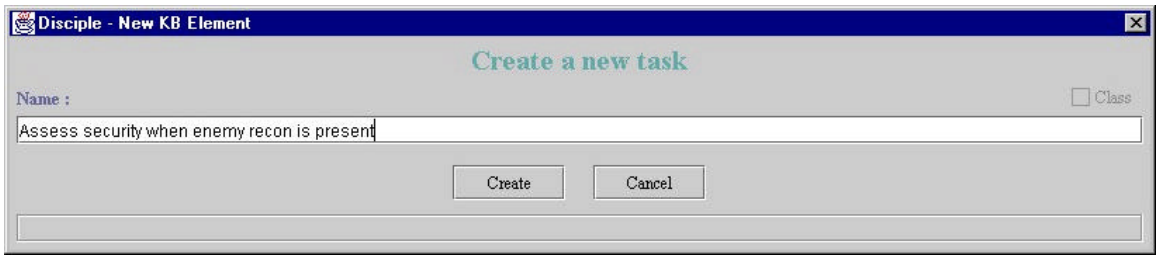
Select “List all” if you would like to verify that the KB does not contain the task you want to define.



Then click on "New". This will start the process of defining the new task.

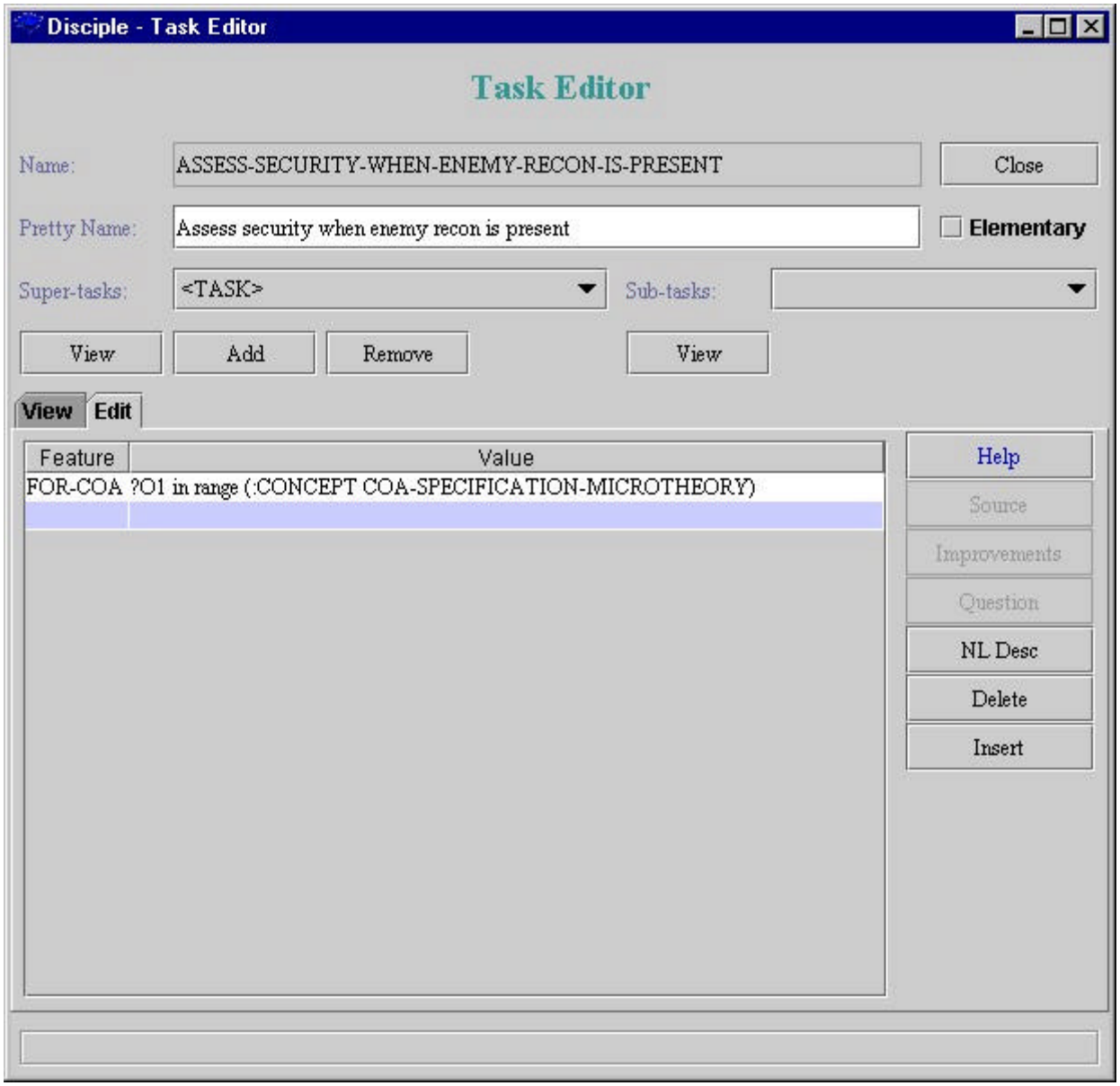
6.1.3.1 Defining a new task with the Task Editor

Write the task name "Assess security when enemy recon is present", or a similar sentence in the "Create a new task" window.



Then click twice on “Create”.

The Task Editor is invoked and you have to complete the definition of the task.



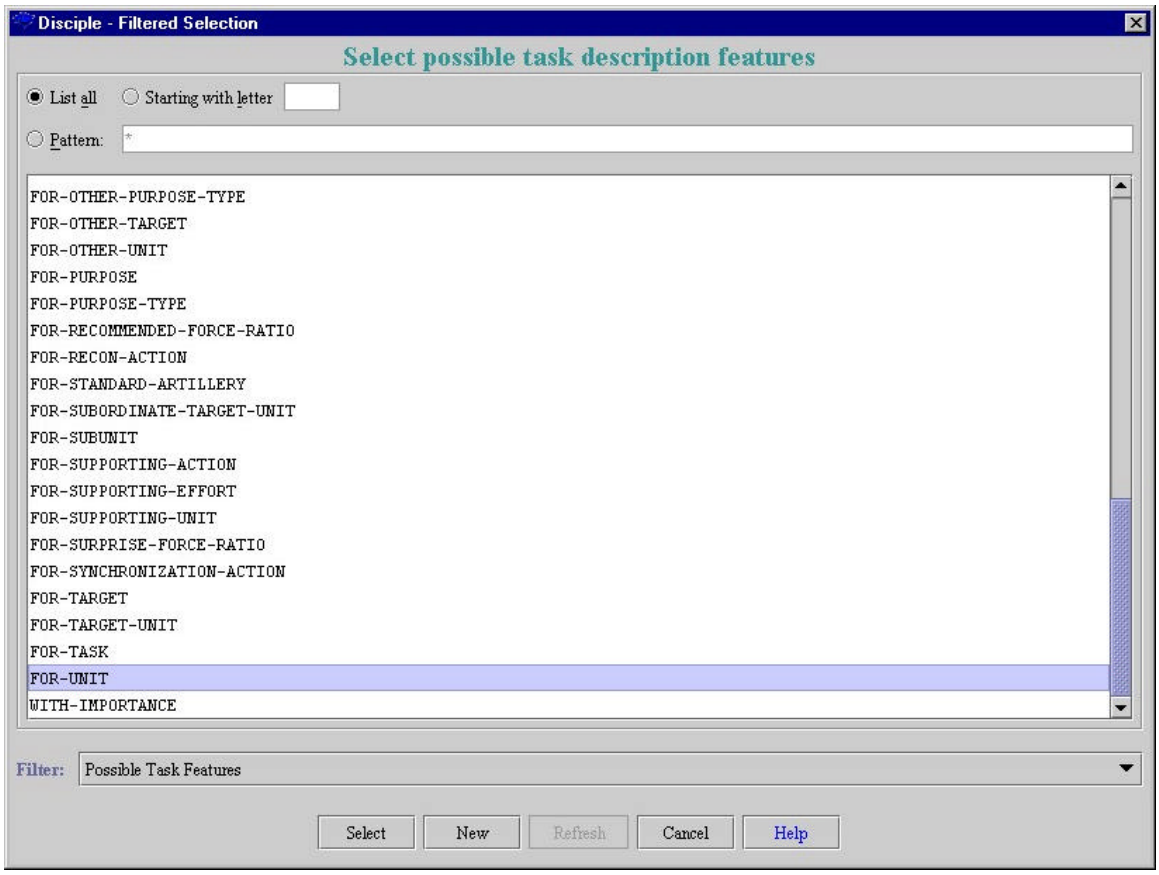
This task should have additional features, one to specify the enemy unit, and the other to specify the action performed by that unit.

Click on Insert to add the first feature.

The “Select possible task description features” window is displayed.

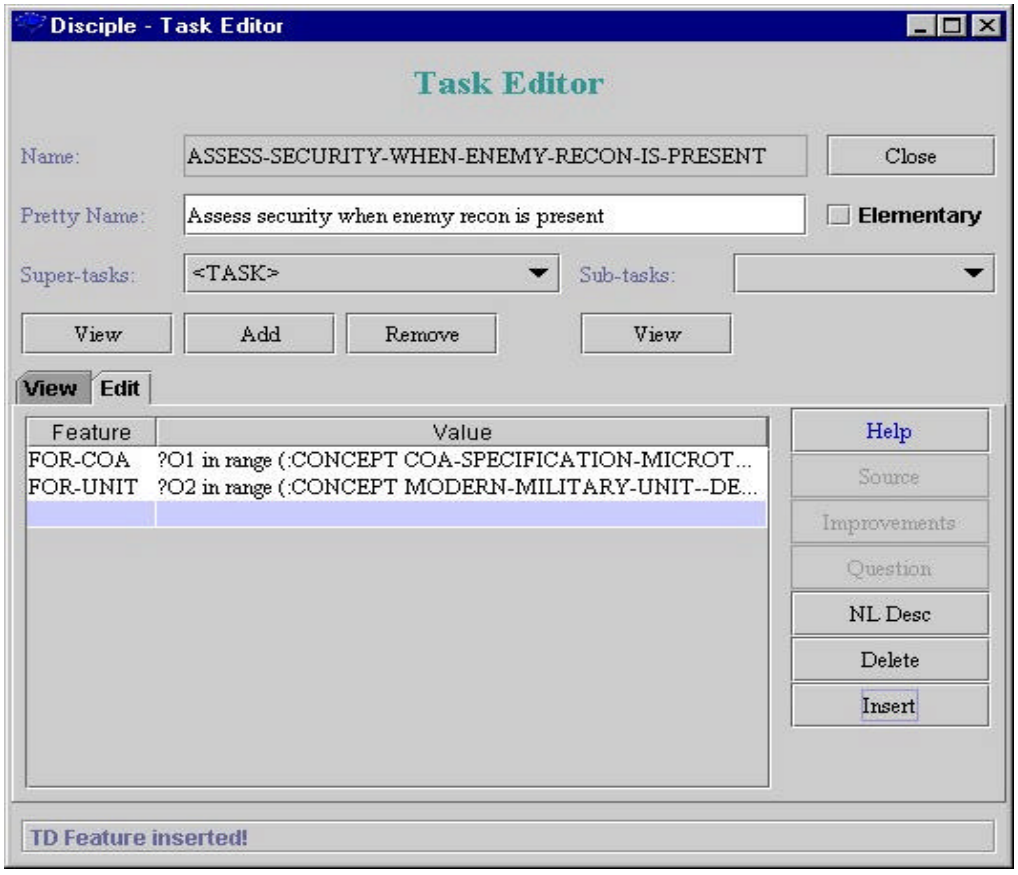
Select the “List all” filter.

Scroll the displayed features and click on “FOR-UNIT”.



Now click on “Select”.

The new feature is introduced in the list of the task features.

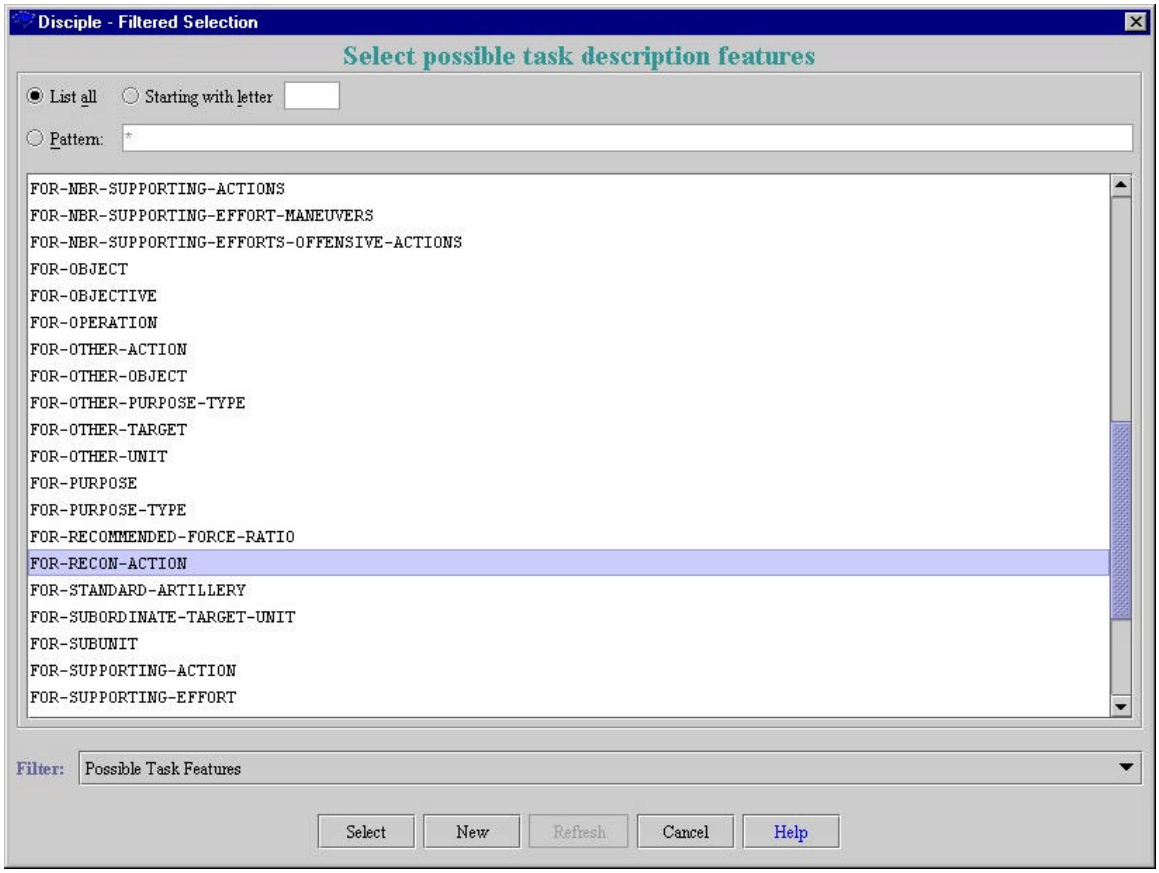


We need to repeat this process to insert a new feature in the definition of the task.

Click on “Insert”.

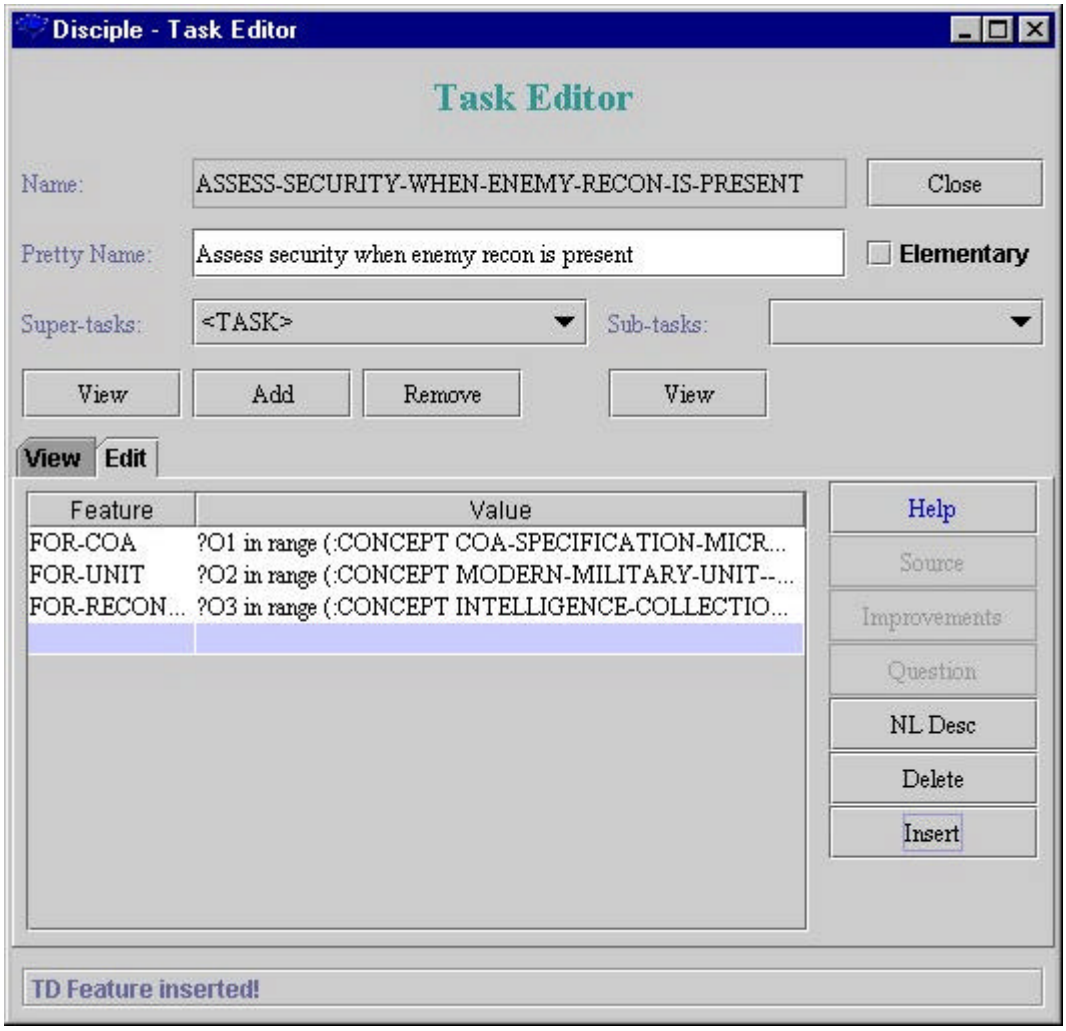
Select the “List all” filter in the “Select possible task description features” window.

Scroll the displayed features and click on “FOR-RECON-ACTION”.



Now click on “Select”.

The new feature is introduced in the list of task features.

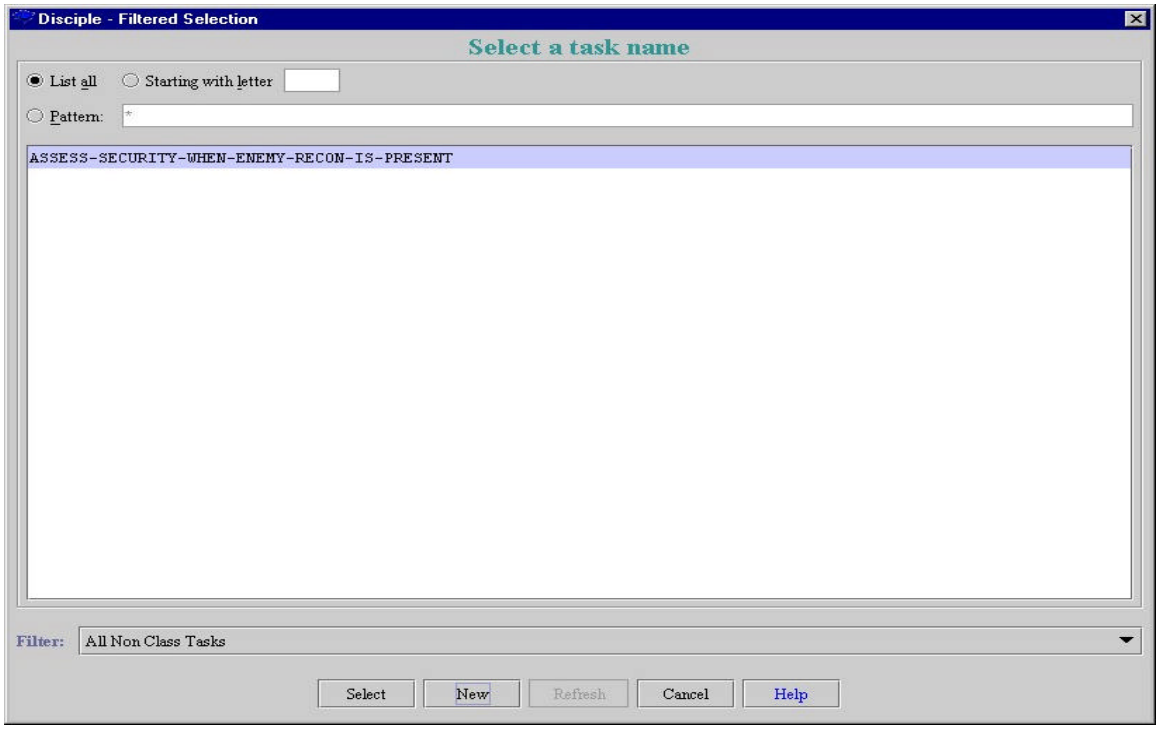


Now the definition of the task is complete enough.

Click on “Close”.

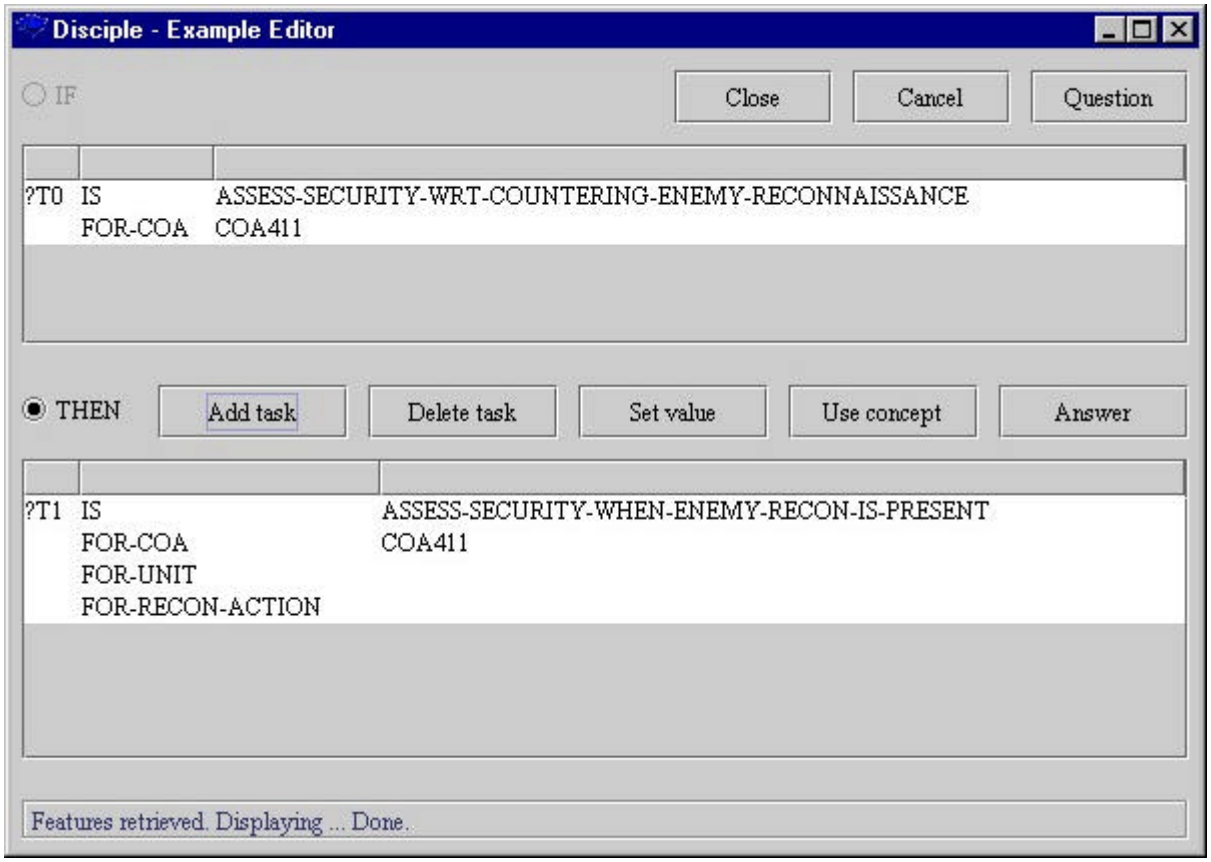
This ends the process of defining the new task. This task is now introduced in the KB of Disciple and can be used in completing the current reduction.

The new task is displayed and selected in the “Select a task name” window of the Filtered Selection tool.



Click on “Select”.

A partial instance of the tasks appears in the bottom pane of the “Example Editor” window.

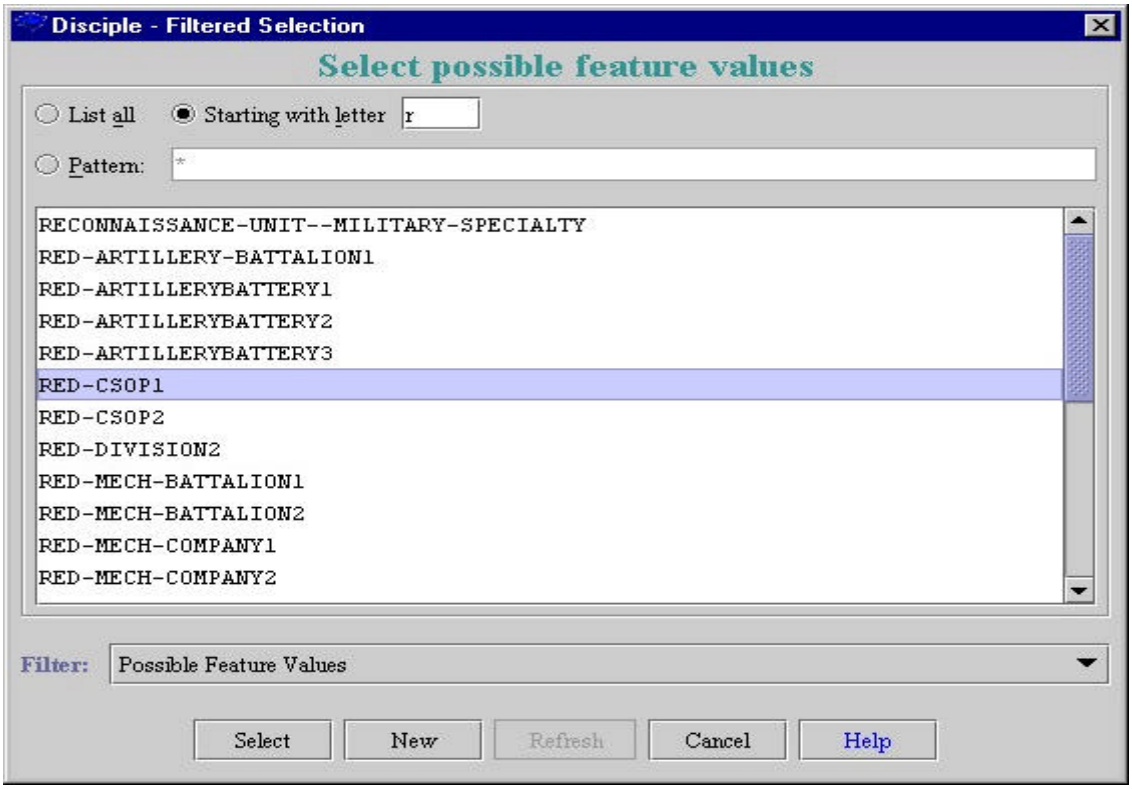


We now need to complete the description of the task by supplying values for the features "FOR-UNIT" and "FOR-RECON-ACTION".

Select the line corresponding to the feature "FOR-UNIT"

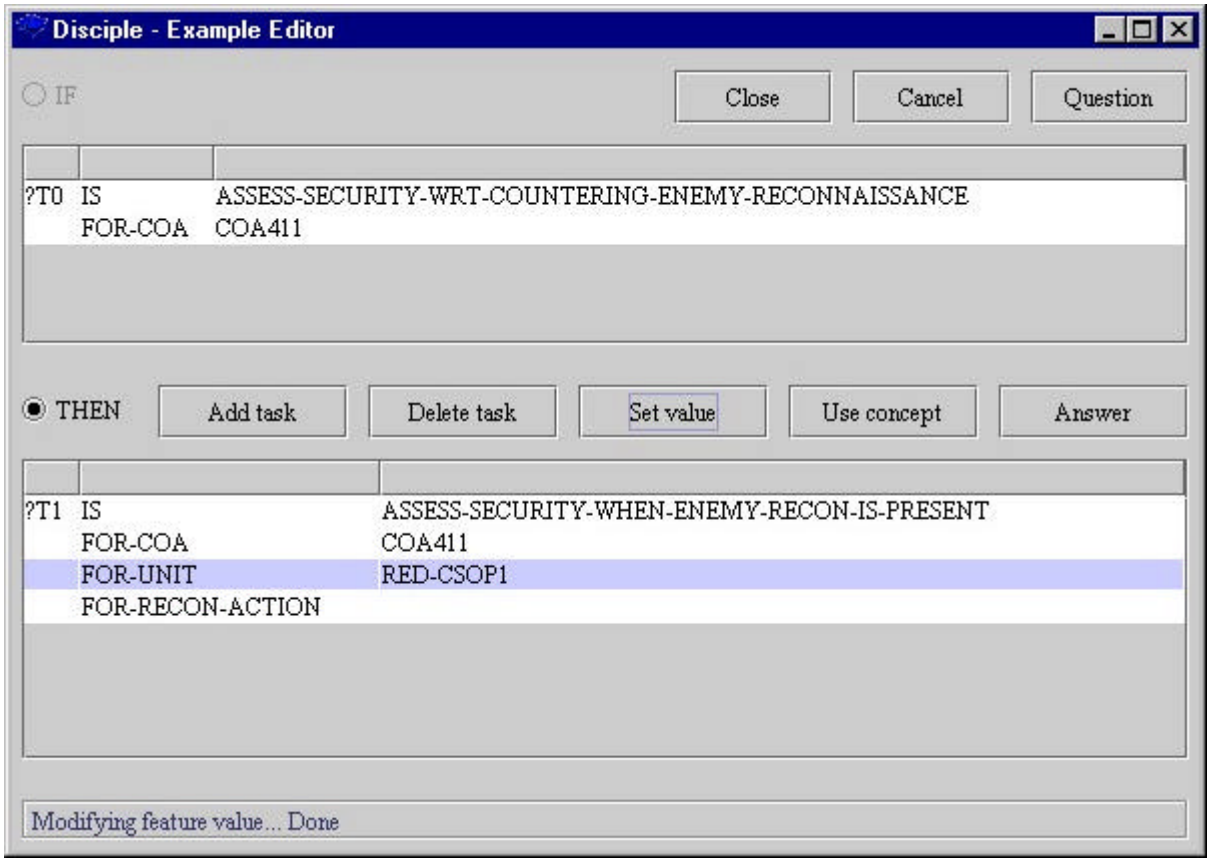
Then click on "Set value".

In the "Select possible feature values" window select the "Starting with letter" filter and write the letter "r". Disciple will display all the objects from the KB that start with "R".



Click on “RED-CSOP1” and then on “Select”.

“RED-CSOP1 is selected as value of the feature “FOR-UNIT”.



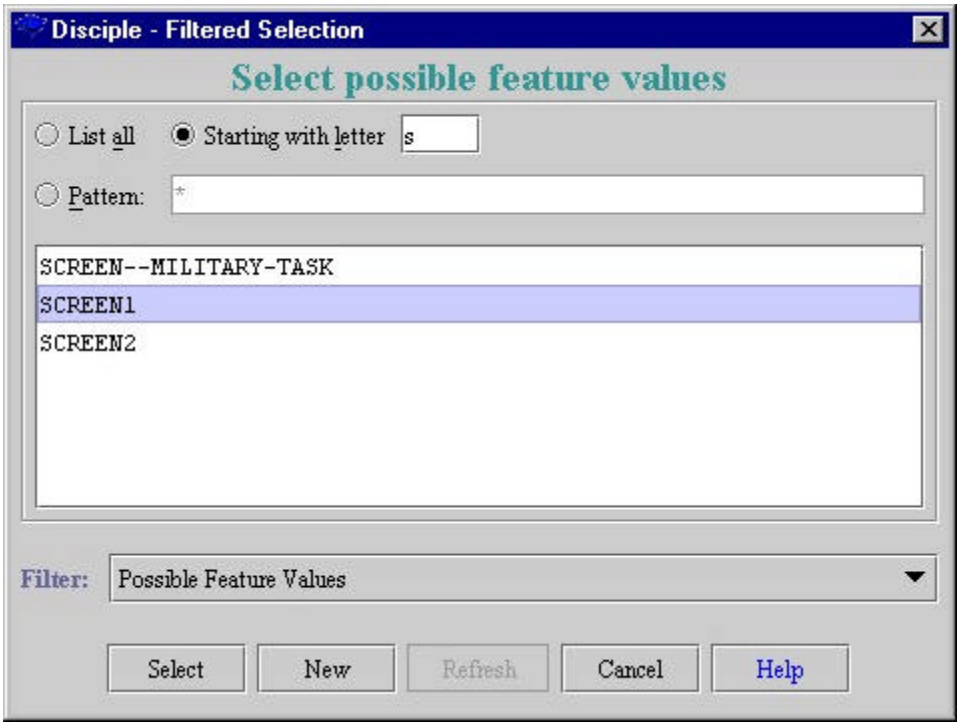
You need to repeat this process for the feature "FOR-RECON-ACTION".

Select the line corresponding to the feature "FOR-RECON-ACTION" in the "Example Editor" window.

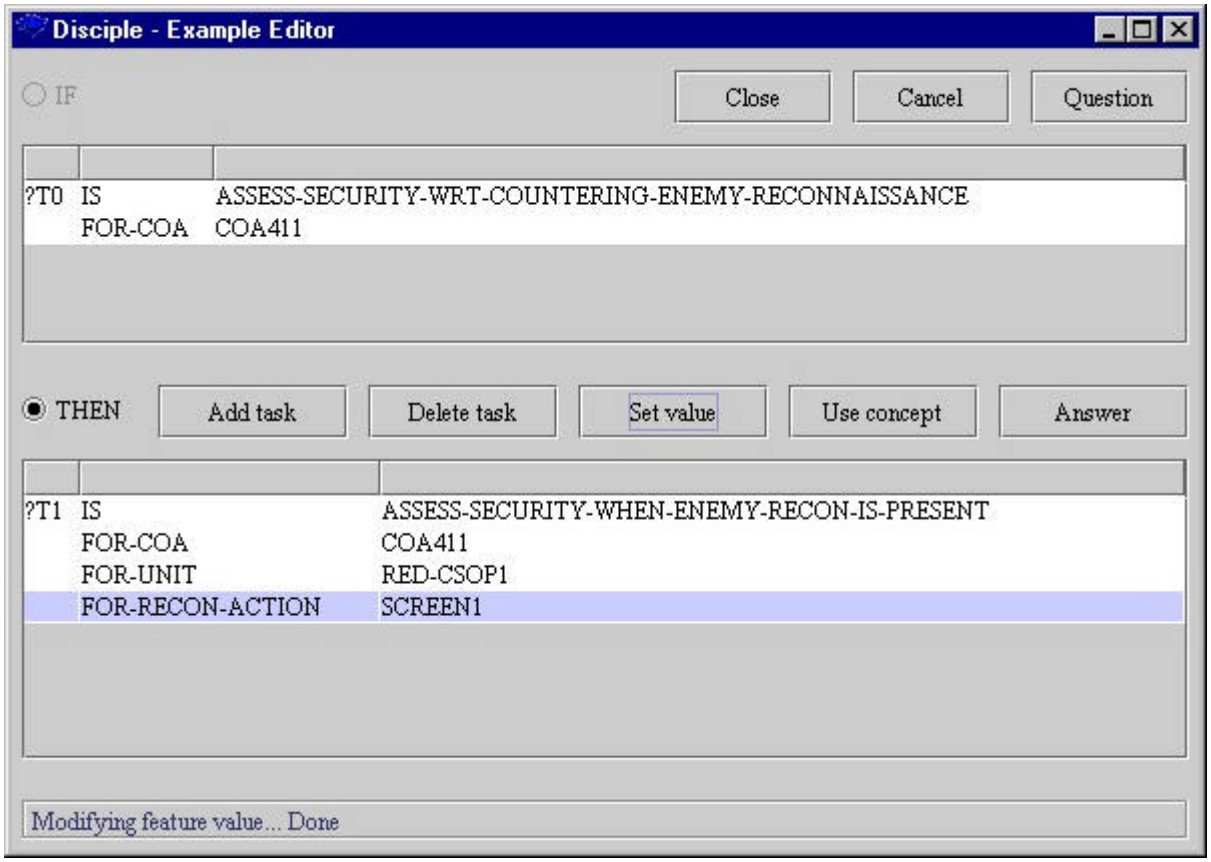
Then click on "Set value".

In the "Select possible feature values" window select the "Starting with letter" filter and write the letter "s". Disciple will display all the objects from the KB that start with "S".

Click on "SCREEN1" and then on "Select".



"SCREEN1" is introduced as value of the feature "FOR-RECON-ACTION".



Click on “Close”.

This ends the definition of the current reduction with the Example Editor.

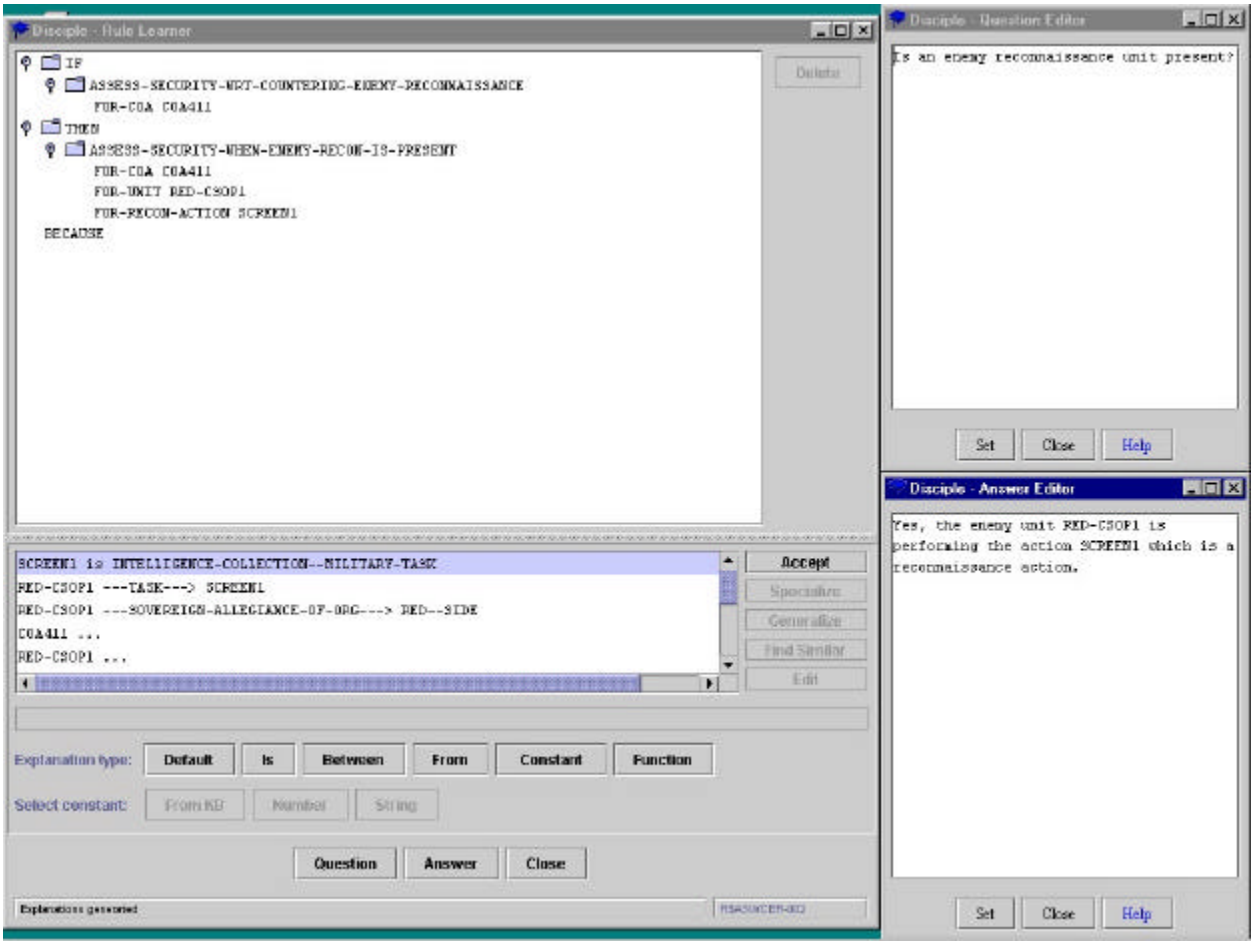
6.1.4 Interacting with the Rule Learner

The Rule Learner is automatically invoked, Disciple trying to learn a rule from the example defined above.

You will have to help Disciple to understand why the task of assessing security of COA411 with respect to (wrt) countering enemy reconnaissance is reduced to one of assessing security when the enemy reconnaissance is present. The explanation is a formal representation of the information from the question and the answer. However, Disciple-HPKB does not have the ability to understand natural language and to translate the question and the answer into the corresponding explanation pieces. Also, you probably cannot formulate the explanation by yourself. First of all there are many hundreds of object names and feature names in Disciple's knowledge base (such as "SOVEREIGN-ALLEGIANCE-OF-ORG") and you are not familiar enough with them. Secondly, you are probably not familiar enough with the formal syntax of Disciple, to be able to correctly define formal explanations.

Disciple simplifies this process for us. First of all, it will start by proposing plausible explanations of the current task reduction example using analogy with rules learned from similar examples. These potential

explanations are displayed in the bottom pane of the "Rule Learner" window. We only need to understand these expressions and to select those that are indeed explanations.



The first explanation piece proposed by Disciple (and already selected by it) is:

SCREEN1 is INTELLIGENCE-COLLECTION–MILITARY-TASK

This states in Disciple's language that SCREEN1 is a reconnaissance action. Therefore we accept it by clicking on the "Accept" button.

This explanation piece will be moved on the top pane, after the BECAUSE label.

The next explanation piece proposed by Disciple is:

RED-CSOP1 TASK SCREEN1

It expresses, in Disciple's language, that RED-CSOP1 is performing the action SCREEN1.

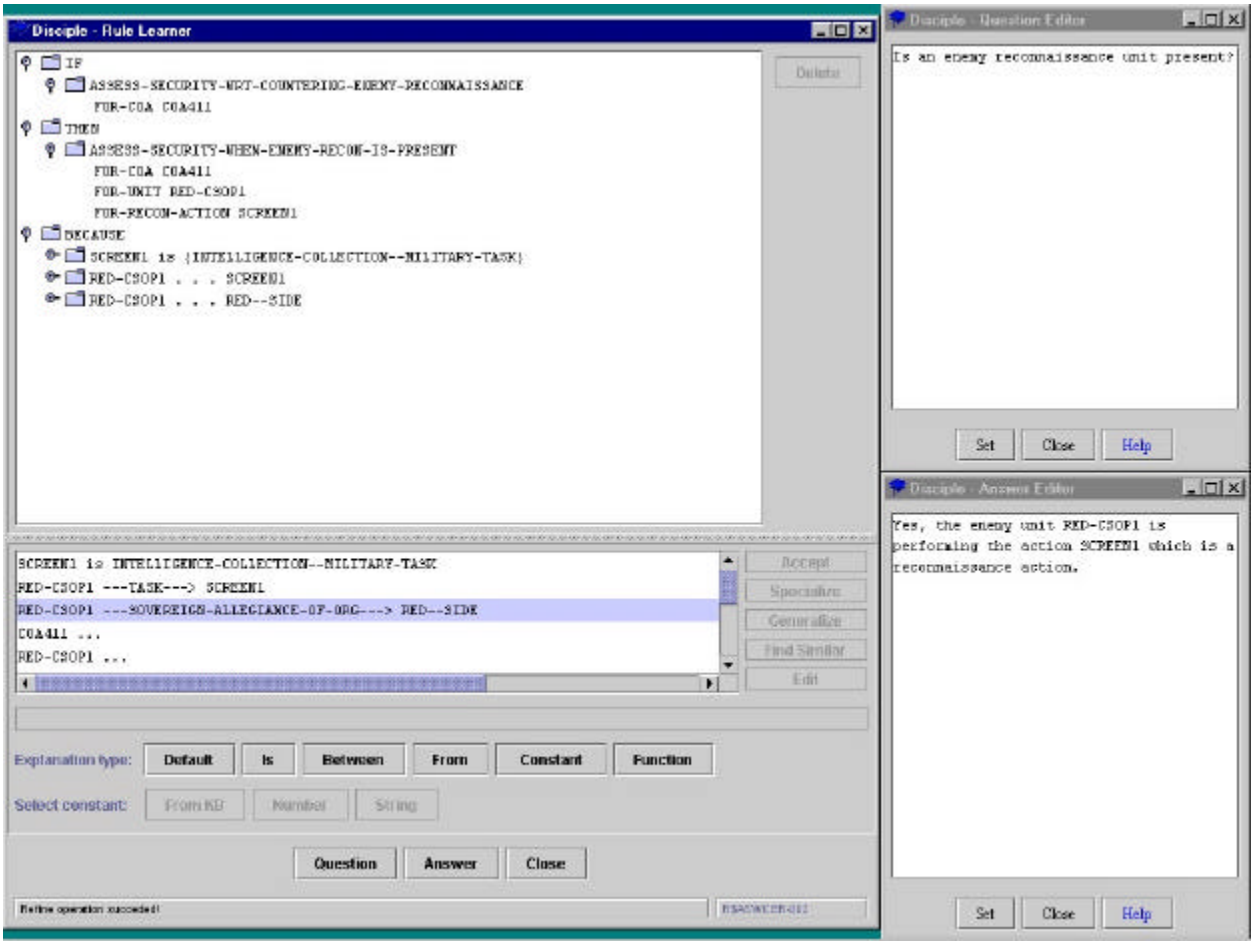
We accept this explanation piece as well, by clicking first on it, and then on the "Accept" button. Notice that it is displayed in the top pane in an abstract form. Click on it and you will see the complete form of

this explanation piece. Click on the complete form and Disciple will display it vertically so that you can now point to individual pieces of this explanation, such as "SCREEN1". We will use this feature latter.

The third explanation piece proposed by Disciple is:

RED-CSOP1 SOVEREIGN-ALLEGIANCE-OF-ORG RED--SIDE

It identifies RED-CSOP1 as an enemy unit, and we will select it by clicking on "Accept".

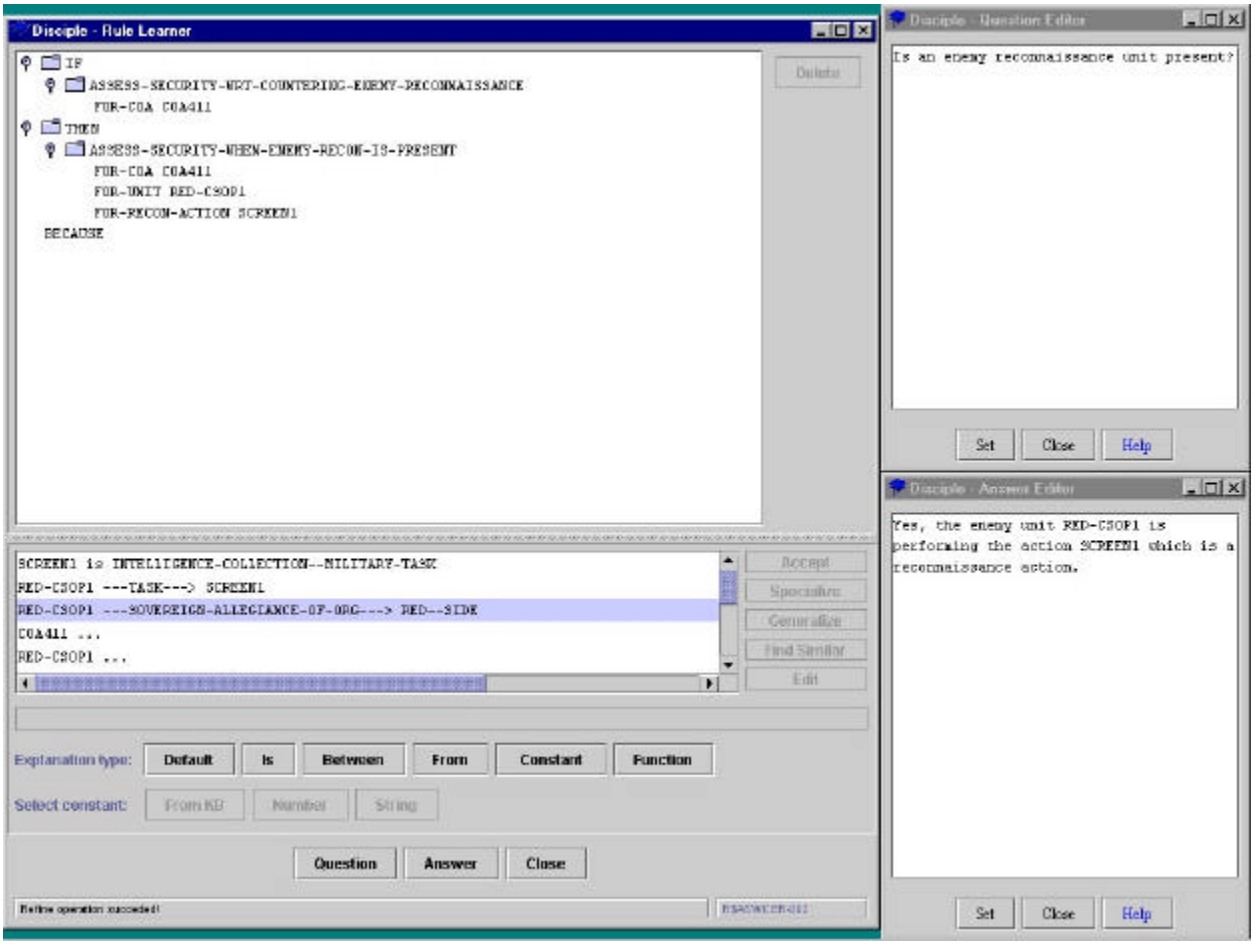


The above process was very easy for us because Disciple was able to propose the relevant explanation pieces and we only had to select them. In general, however, at least some of the explanations will not be generated by Disciple. In such a case we will need to guide Disciple in generating them by providing hints. To illustrate this feature, let us delete the explanations from the top pane of the "Rule Learner" window.

Select "SCREEN1 is {INTELLIGENCE-COLLECTION--MILITARY-TASK}" in the top pane of the "Rule Learning" window. Then click on "Delete".

Select "RED-CSOP1 … SCREEN1" in the top pane of the "Rule Learning" window. Then click on "Delete".

Select “RED-CSOP1 … RED–SIDE” in the top pane of the “Rule Learning” window. Then click on “Delete”.



You want to guide Disciple to generate the above explanations.

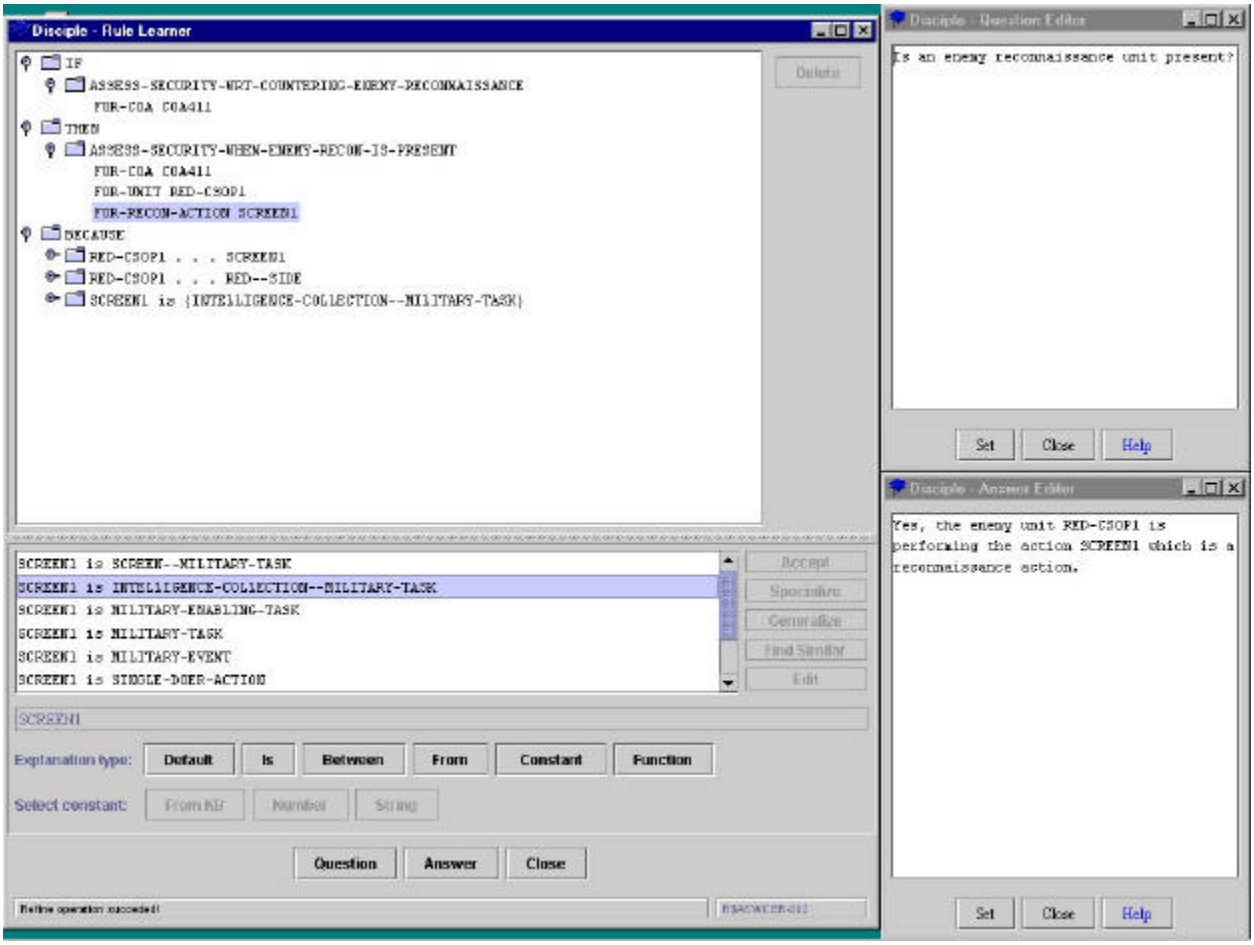
Let us consider first the explanation that states that “RED-CSOP1 is performing the action SCREEN1”. You can do it by using a “Between” hint. You can simply select the "Between" button, and then click on "RED-CSOP1" and on "SCREEN1" in the example (i.e. where they appear as values of the features “FOR-UNIT” and “FOR-RECON-ACTION”). This directs Disciple to look (in the object ontology) for the paths between "RED-CSOP1" and "SCREEN1". These paths represent plausible explanations and are displayed in the bottom left pane of the “Rule Learning” window. One of these paths is "RED-CSOP1 TASK SCREEN1". Select it and then click on “Accept”, as explained above.

You also want to tell Disciple that it is important that RED-CSOP1 is an enemy unit. You do not know how this piece of knowledge is represented in the KB of Disciple, but it should be something related to RED-CSOP1. You can provide Disciple a hint of type “From”. A "From" hint is given by selecting the "From" button and then clicking on an object in the example, such as "RED-CSOP1". Disciple will look for an explanation in the form of a sequence of features and values, starting with "RED-CSOP1". One of

the generated explanations will be "RED-CSOP1 SOVEREIGN-ALLEGIANCE-OF-ORG RED-SIDE". Select it and then click on “Accept”, as explained above.

Finally, you want to tell Disciple that RED-CSOP1 is an enemy reconnaissance unit. In the Answer we recognized RED-CSOP1 as a reconnaissance unit because it performs the action “SCREEN1” which is a reconnaissance action. You should therefore give Disciple a hint of type “Is”. This hint tells Disciple that SCREEN1 should be of a certain type (i.e. a reconnaissance action). Click on the “Is” button. Then, in the top pane, click on SCREEN1 where it appears as a value of the feature “FOR-RECON-ACTION”. Disciple will display, in the bottom pane, all the explanations of type “Is” for SCREEN1. One of them is "SCREEN1 IS INTELLIGENCE-COLLECTION--MILITARY-TASK". Select it and then click on “Accept”, as explained above.

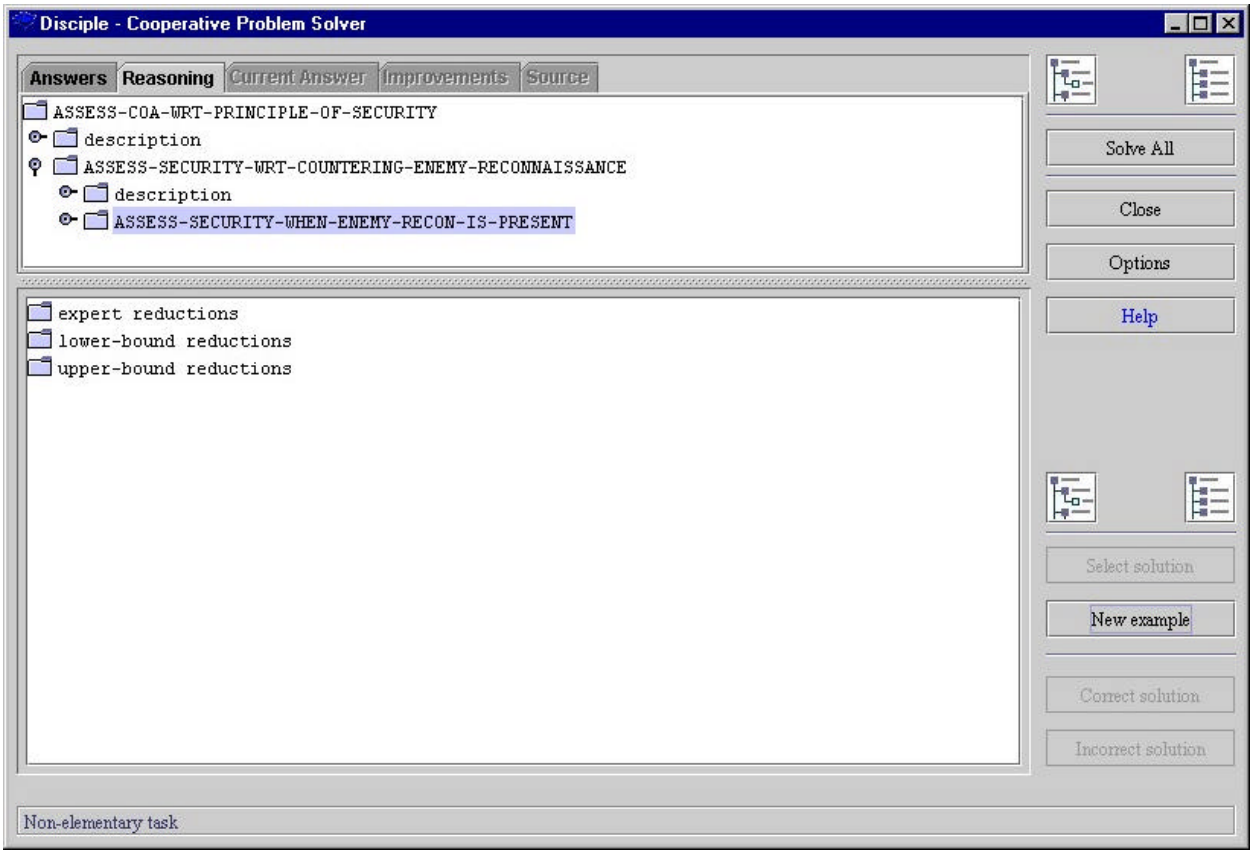
Disciple has now an explanation of the current example.



Click on “Close”. At this point Disciple will generate a rule based on this example and its explanations, and it will introduce it in the KB.

This ends the process of learning a rule from the current example and Disciple will return to the Cooperative Problem Solver.

Notice that we do not need to look at the learned rule. However, if we wish, we can display it by using the Rule Editor, as will be illustrated latter.



Notice that the Cooperative Problem Solver window shows the reduction indicated by us in the top pane. Notice also that it cannot propose any reduction of the bottom level task. Therefore we need again to provide the reduction by clicking on "New example". This will lead us to the same sequence of operations as before.

6.1.5 Defining a task reduction with the Example Editor

The Example Editor is invoked and the top pane displays the current task to be reduced.

We need to assess security of COA411 when enemy recon RED-CSOP1 is present.

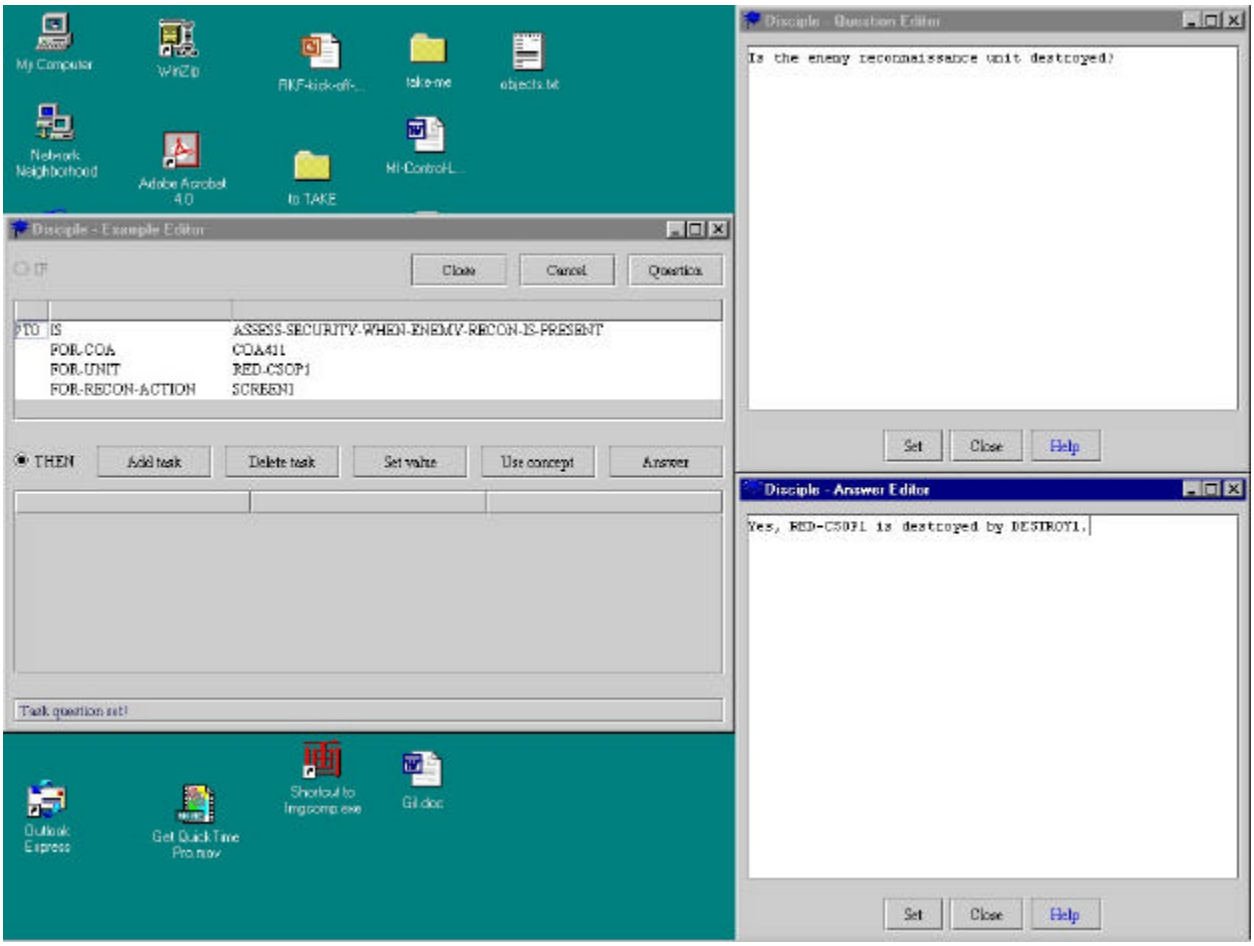
Is the enemy reconnaissance unit destroyed?

Yes, RED-CSOP1 is destroyed by DESTROY1.

Then I can report a strength of COA411 in security because of countering the enemy recon RED-CSOP1.

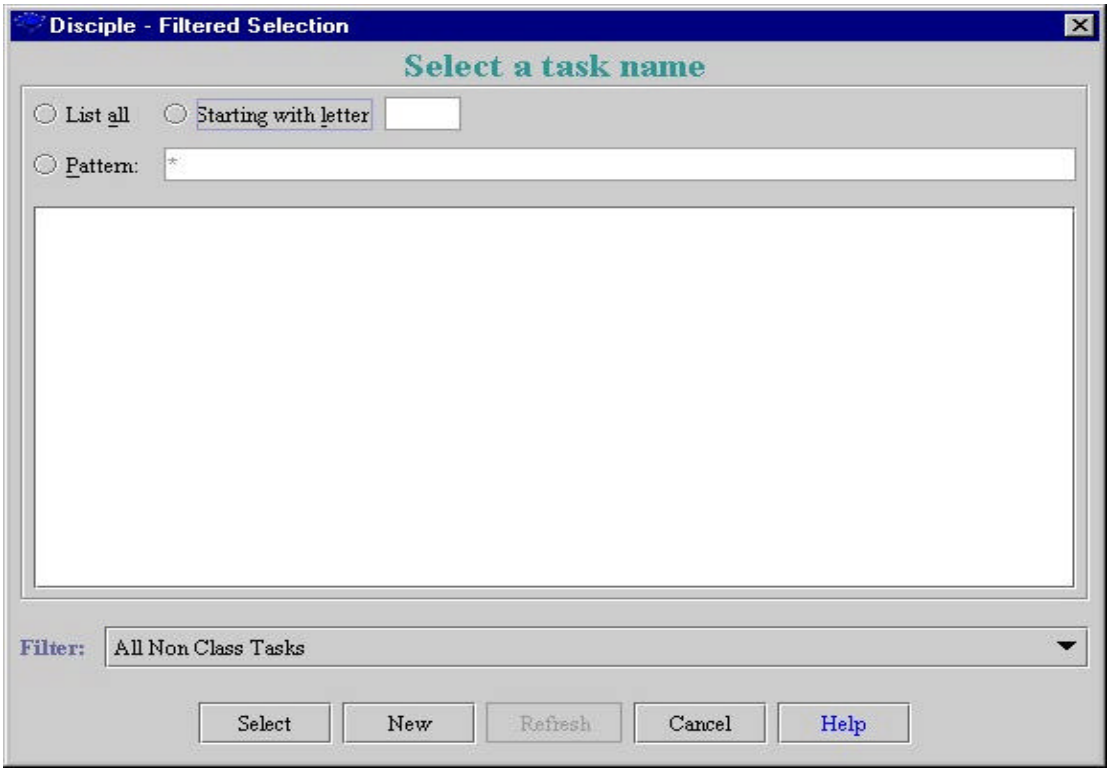
This analysis clarifies the reduction that we want to be performed in this situation.

Introduce the question and the answer in the corresponding windows.



Click on “Add Task”.

The “Select a task name” window will appear.

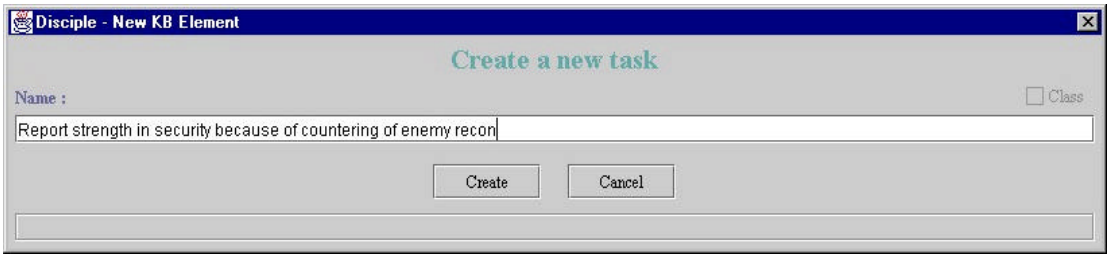


Select "List all" if you would like to verify that the KB does not contain the task.

Then click on "New".

6.1.5.1 Defining a new task with the Task Editor

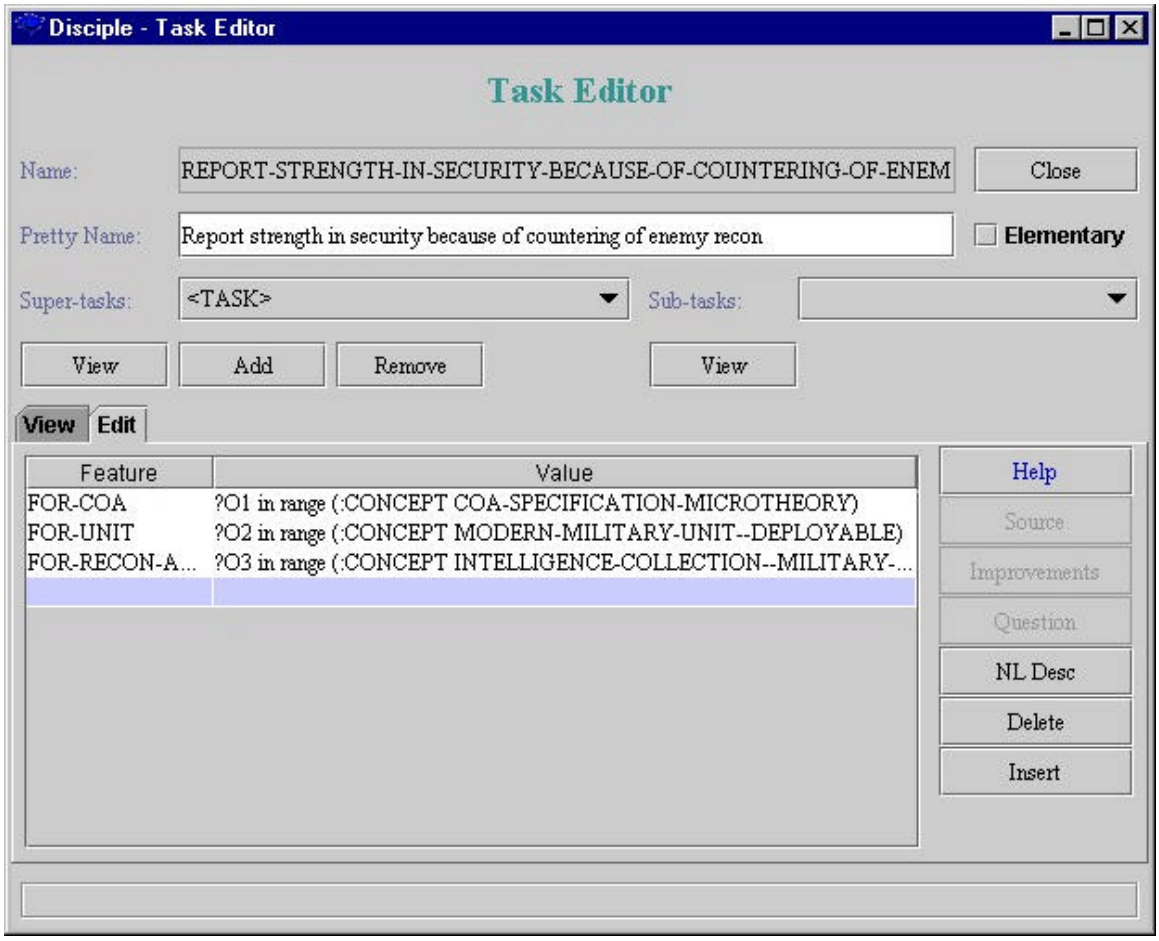
Write the task name "Report strength in security because of countering of enemy recon", or a similar sentence in the "Create a new task" window.



Then click twice on "Create".

The Task Editor is invoked and you have to complete the definition of the task.

This task should have two additional features, one to specify the destroy action, and the other to specify the importance of this strength.

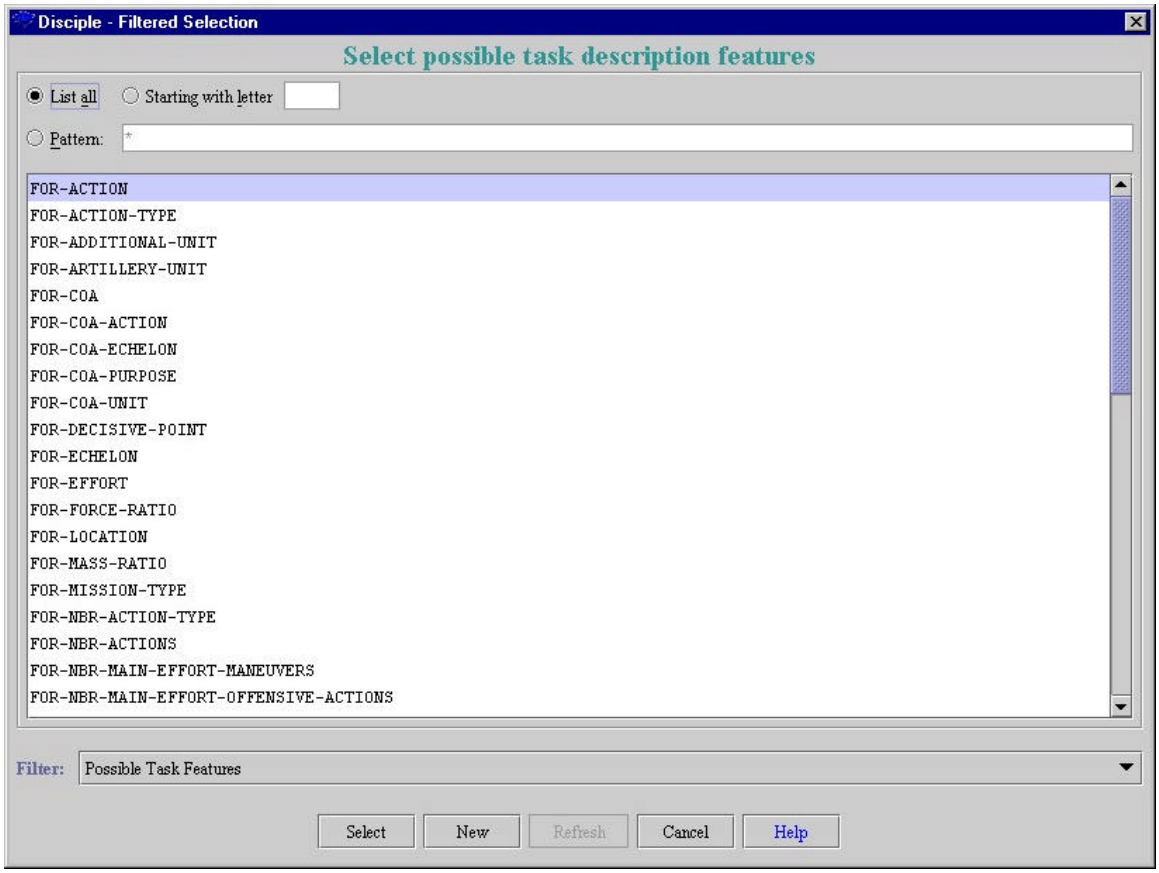


Click on Insert to add the first feature.

The “Select possible task description features” window is displayed.

Select the “List all” filter.

Click on “FOR-ACTION”.



Now click on “Select”.

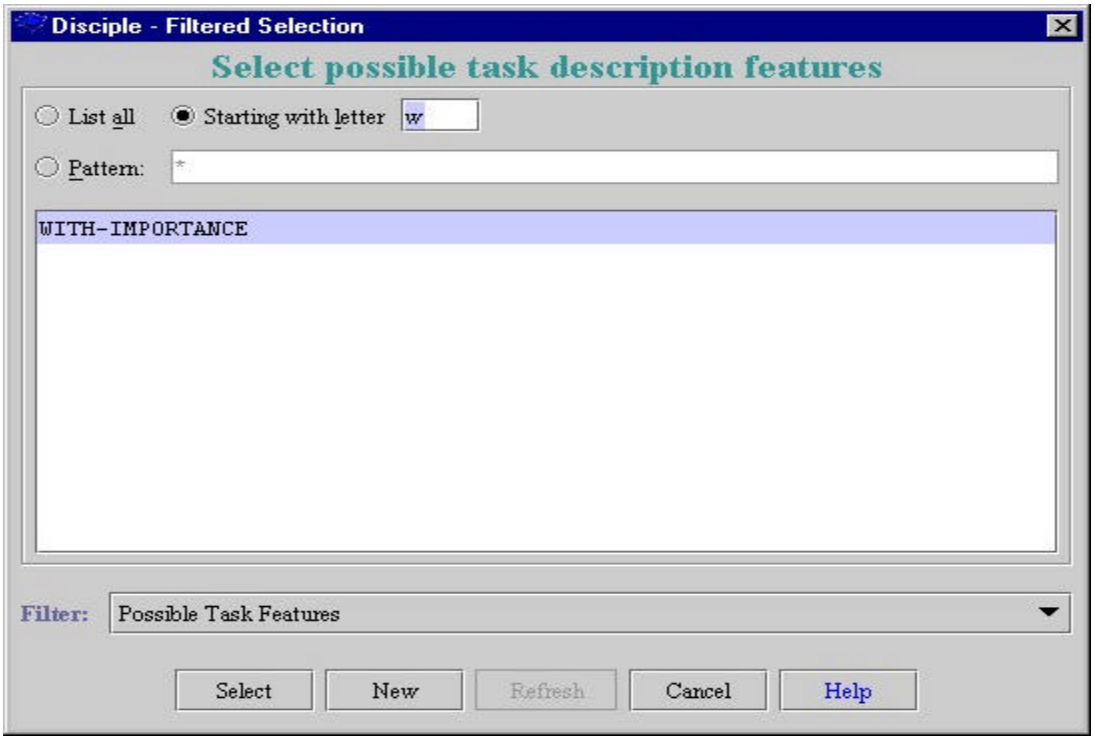
The new feature is introduced in the list of task features.

We need to repeat this procedure to insert a new feature in the definition of the task.

Click on “Insert”.

Click on “Start with letter” and then write “w”.

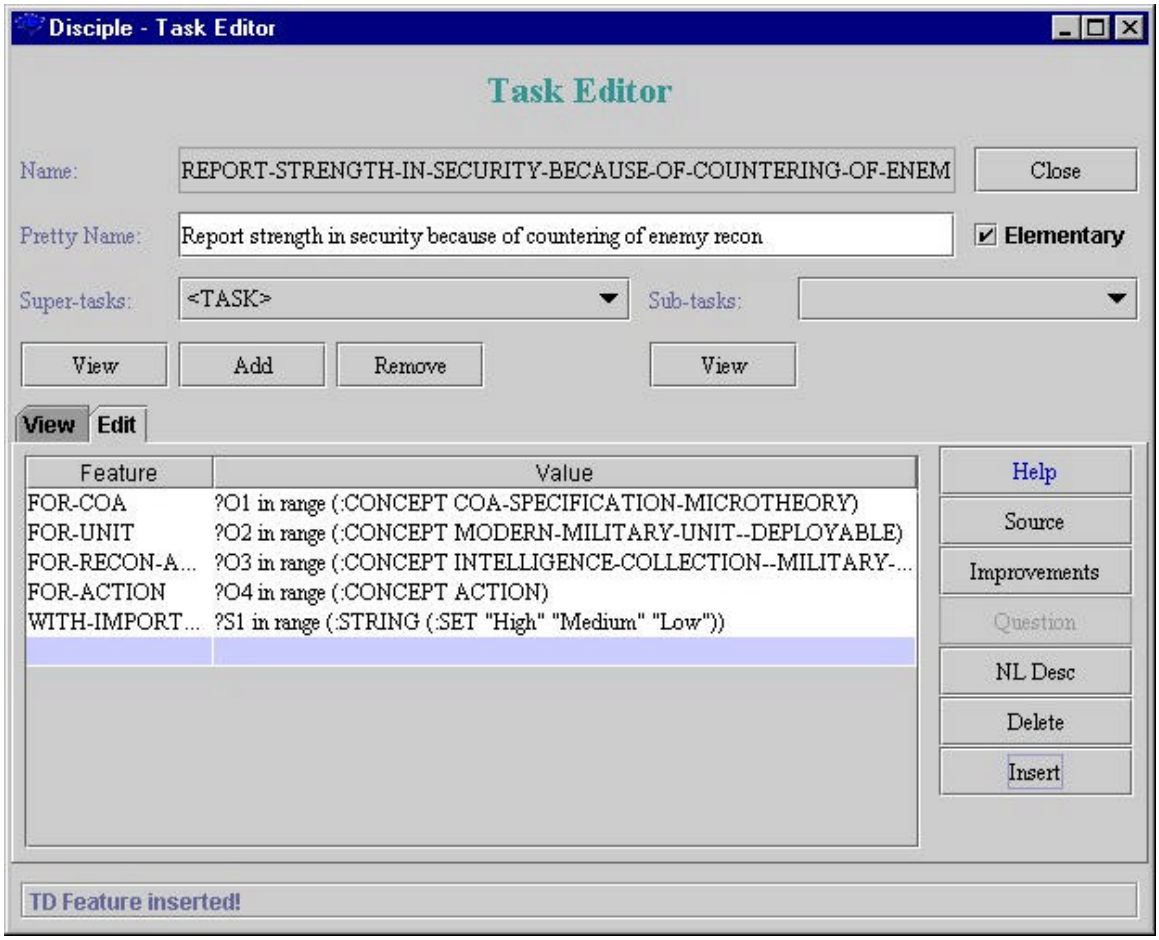
The feature “WITH-IMPORTANCE” is displayed and is already selected.



Now click on “Select”.

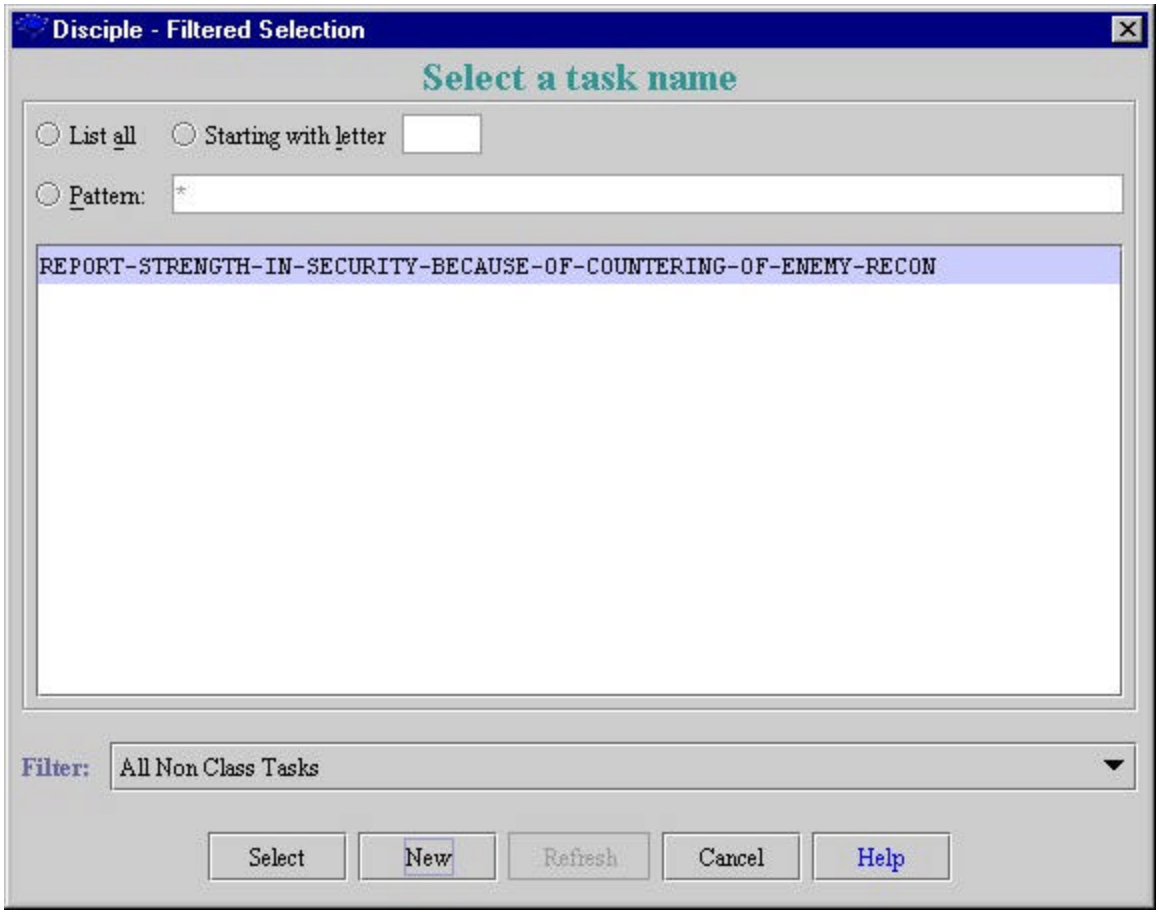
The new feature is introduced in the list of task features.

Because this is an elementary task (a final report of a strength), we need to click on the “Elementary” button. This instructs Disciple to treat this task differently, as you will see bellow.

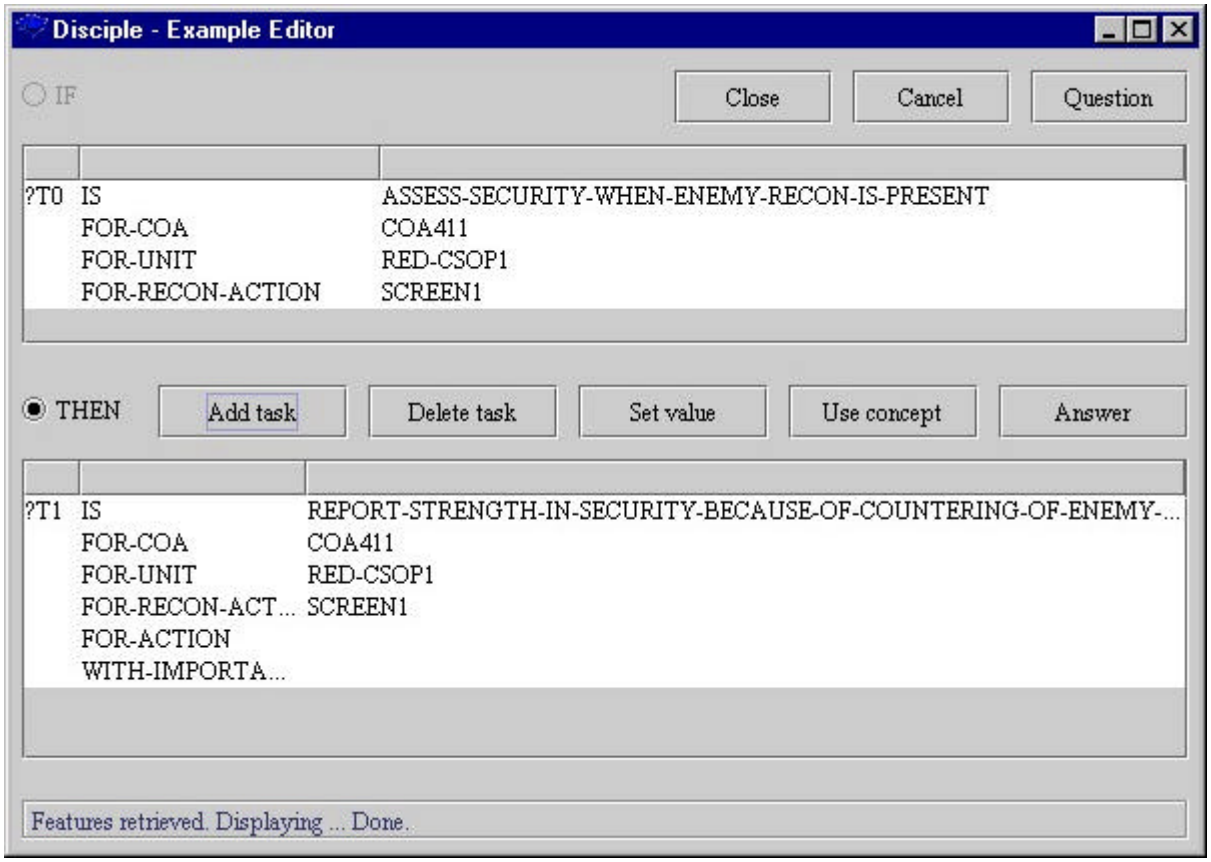


Now the definition of the task is complete. Click on “Close”.

In the “Filtered Selection” window that appears with this task selected, click on “Select”.



Now a partial instance of the defined task is introduced in the bottom pane of the “Example Editor”.

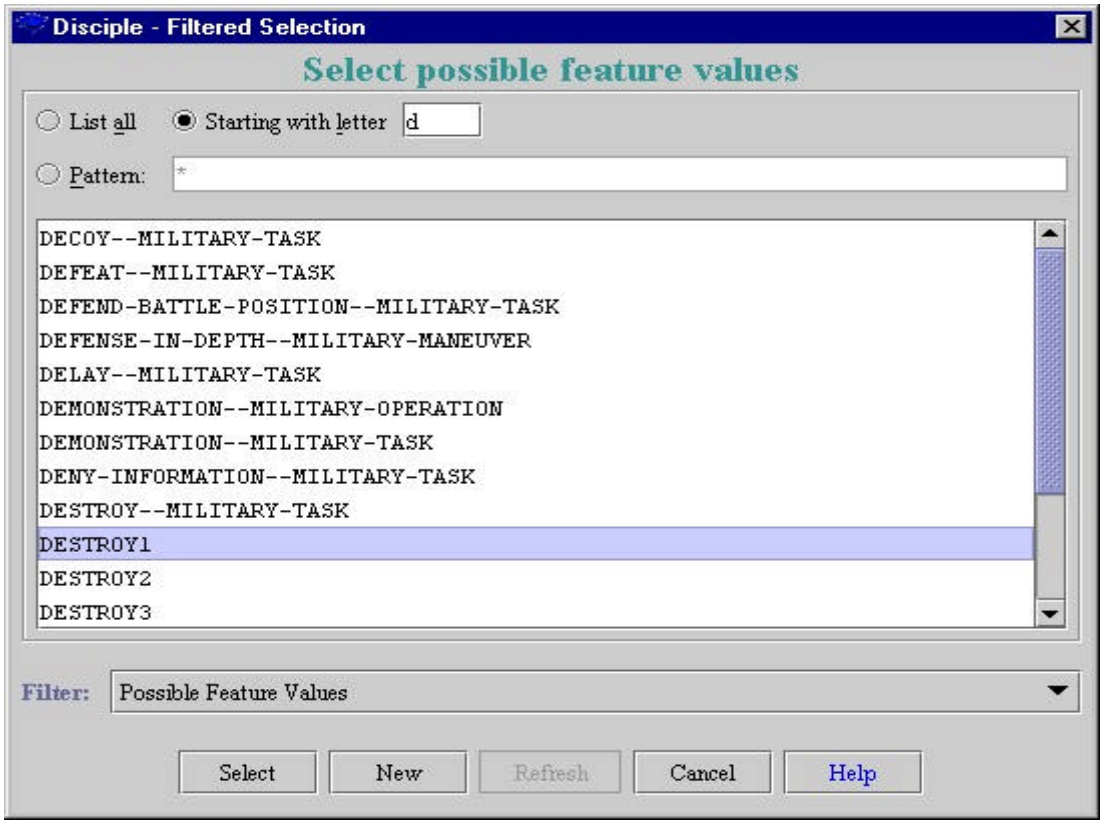


We now need to complete the description of the task by supplying values for the features "FOR-ACTION" and "WITH-IMPORTANCE".

Select the line corresponding to the feature "FOR-ACTION"

Then click on "Set value".

In the "Select possible feature values" window select the "Starting with letter" filter and write the letter "d". Disciple will display all the objects from the KB that start with "D".



Click on “DESTROY1” and then on “Select”.

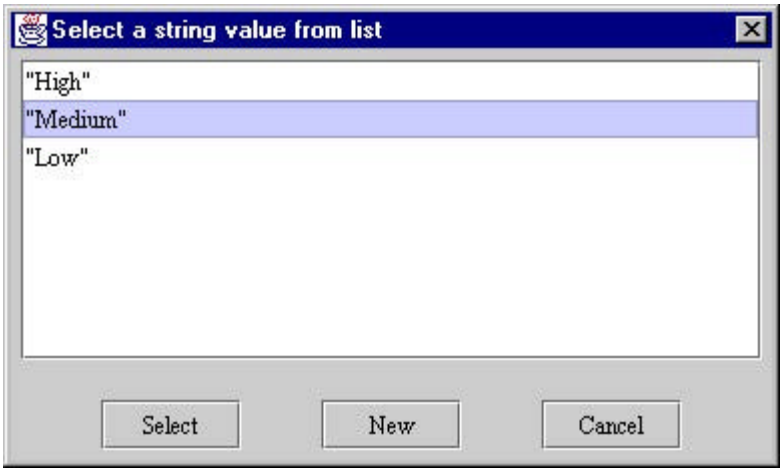
“DESTROY1” is introduced as value of the feature “FOR-ACTION”.

You need to repeat this process for the feature “WITH-IMPORTANCE”.

Select the line corresponding to this feature in the “Example Editor” window.

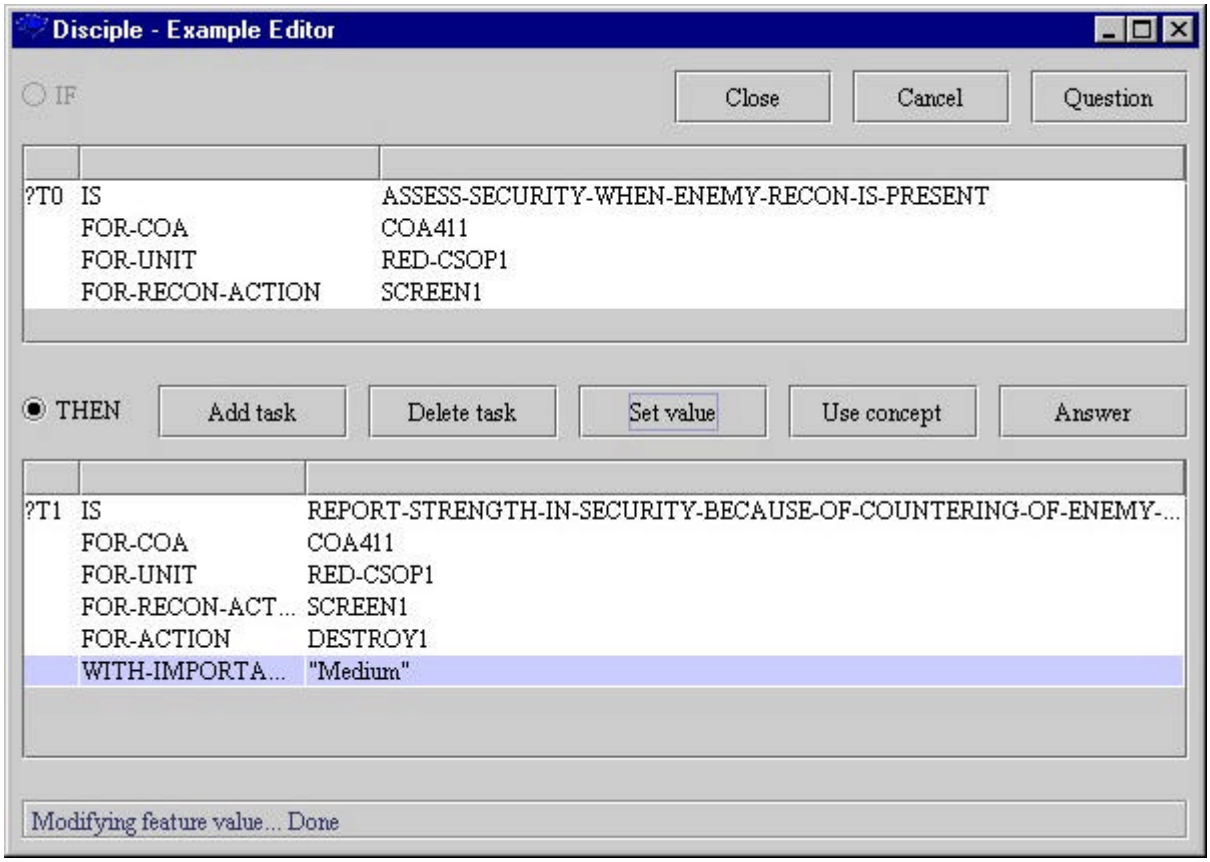
Then click on “Set value”.

The “Select a string value from a list” window will appear that lists all the possible values for this feature.



Click on “Medium” (or on any other value) and then on “Select”.

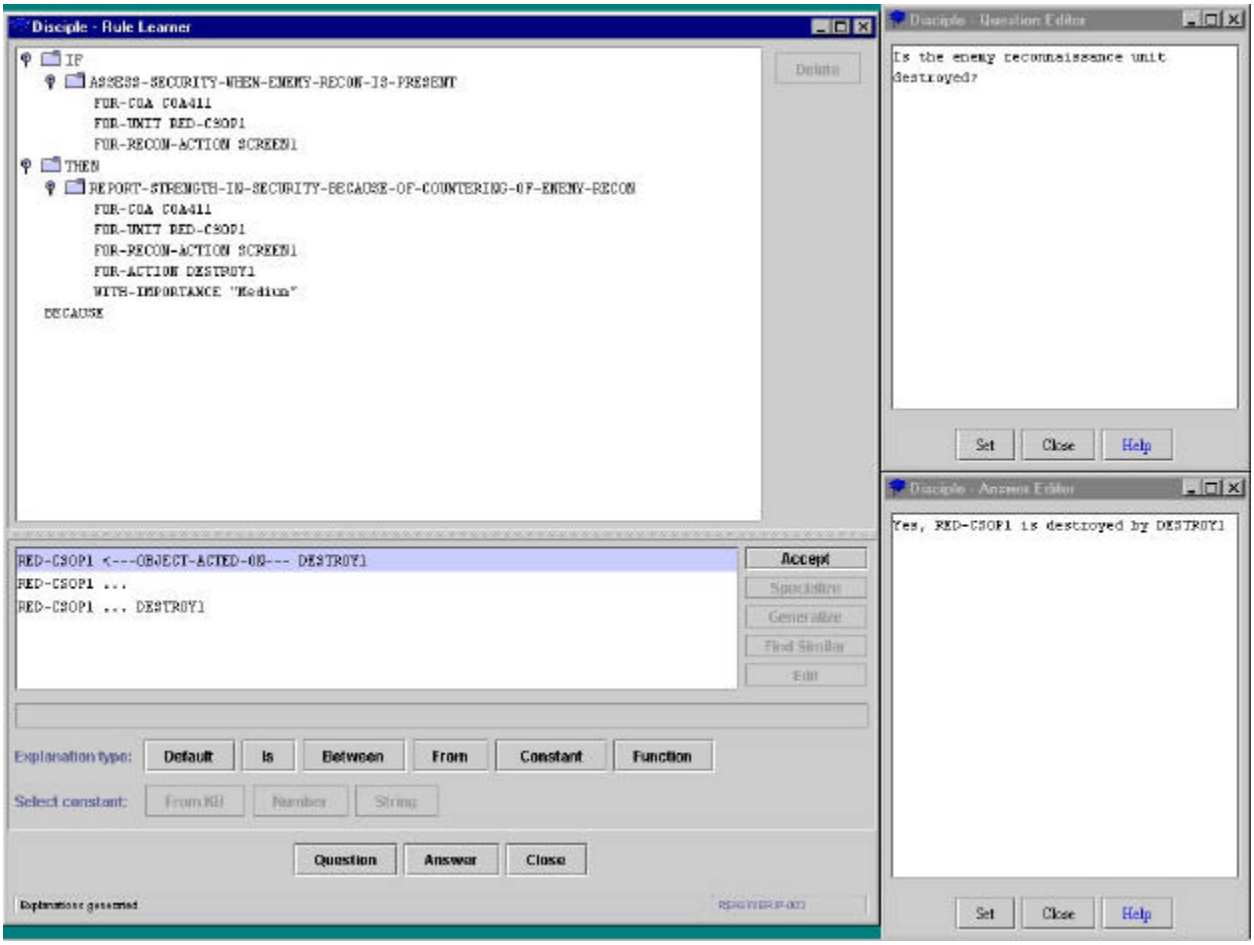
“Medium” is introduced as value of the feature “WITH-IMPORTANCE”.



Click on “Close”.

6.1.6 Interacting with the Rule Learner

The Rule Learner is invoked to learn a task reduction rule from the above example.



You will have to help Disciple to understand why the task of assessing security of COA411 when enemy recon RED-CSOP1 is present is reduced to the one of reporting a strength of COA411 in security because of countering the enemy recon RED-CSOP1.

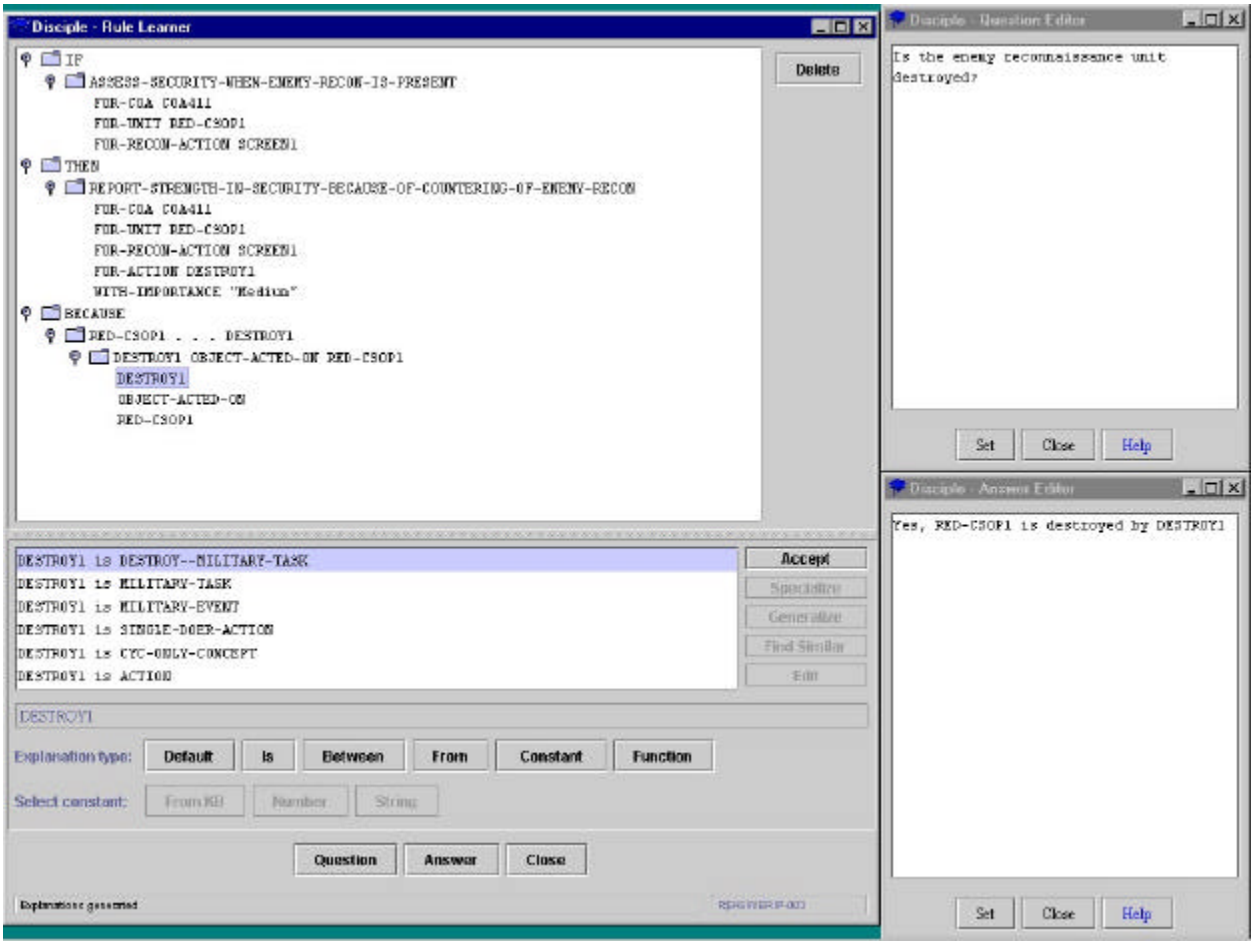
As before, Disciple proposes plausible explanations of the current task reduction example using analogy with rules learned from similar examples. We just need to understand the expressions generated by Disciple and select those that are indeed explanations.

The first explanation piece proposed by Disciple is:

RED-CSOP1 ✍ OBJECT-ACTED-ON --- DESTROY1

We accept this explanation piece by clicking first on it, and then on the "Accept" button.

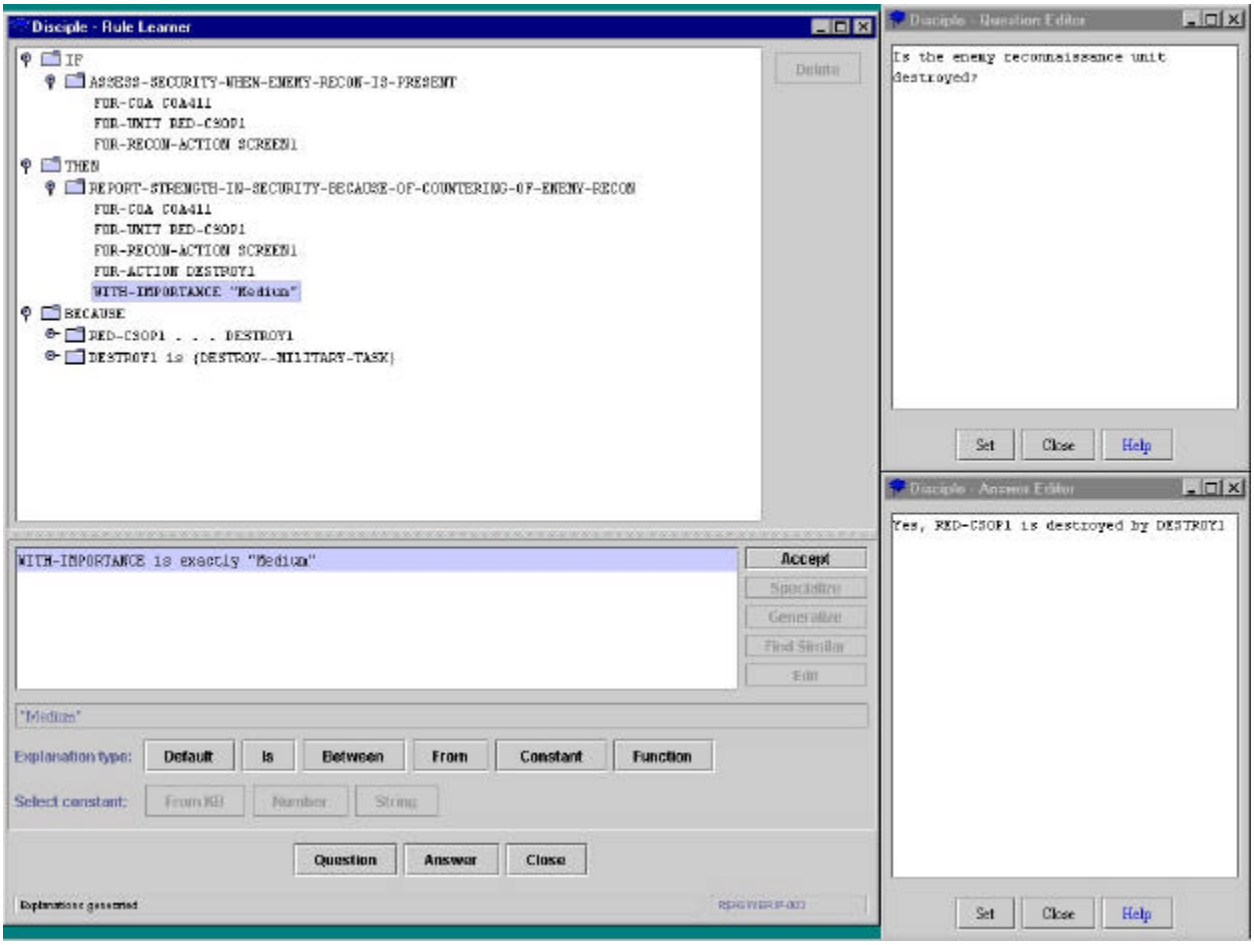
In addition, we need to tell Disciple that it is important that DESTROY1 is a destroy action. To this purpose we will give it a hint of type "Is" with "DESTROY1". "DESTROY1" is part of the last explanation. Double click on this explanation to display it completely. Then double-click again on the complete explanation to display each of its components separately. This will allow you to click on (select) "DESTROY1" as part of the "Is" hint. Now you can give Disciple the Is hint. Click on "Is" and then on "DESTROY1". Disciple displays explanations of type "Is".



Accept the first one: "DESTROY1 is DESTROY–MILITARY-TASK".

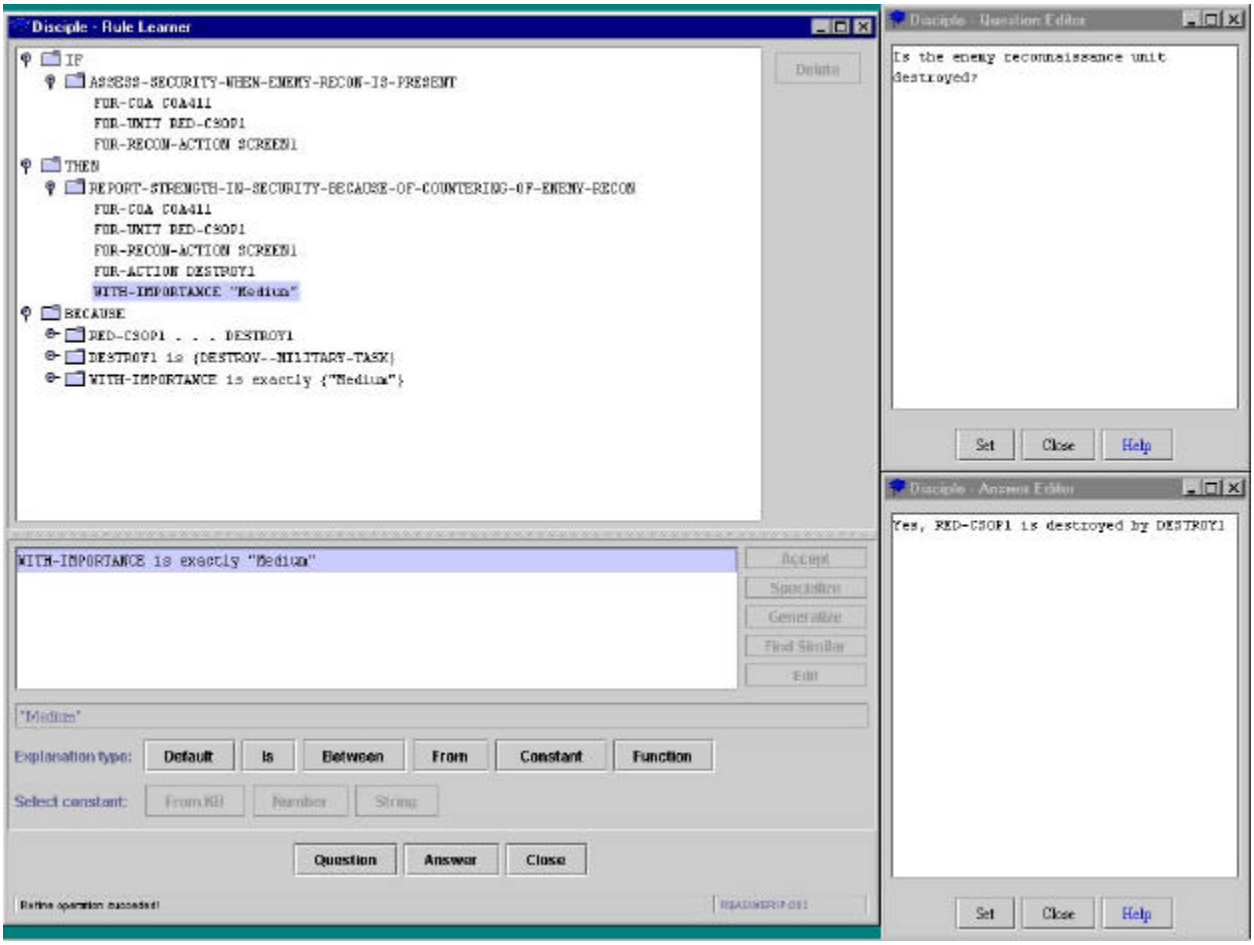
We need to assert a level of importance to this strength is security, therefore let us describe another type of hint that you can give to Disciple. This is the hint "Constant" which tells Disciple that a certain value from the example should be preserved as such in the general rule learned from it. You can use this type of hint to tell Disciple that the importance of the report from this example should always be "Medium". Click on "Constant" and then click on "Medium" in the example (i.e. the line "WITH-IMPORTANCE Medium"). Disciple proposes the explanation

WITH-IMPORTANCE is exactly "Medium".

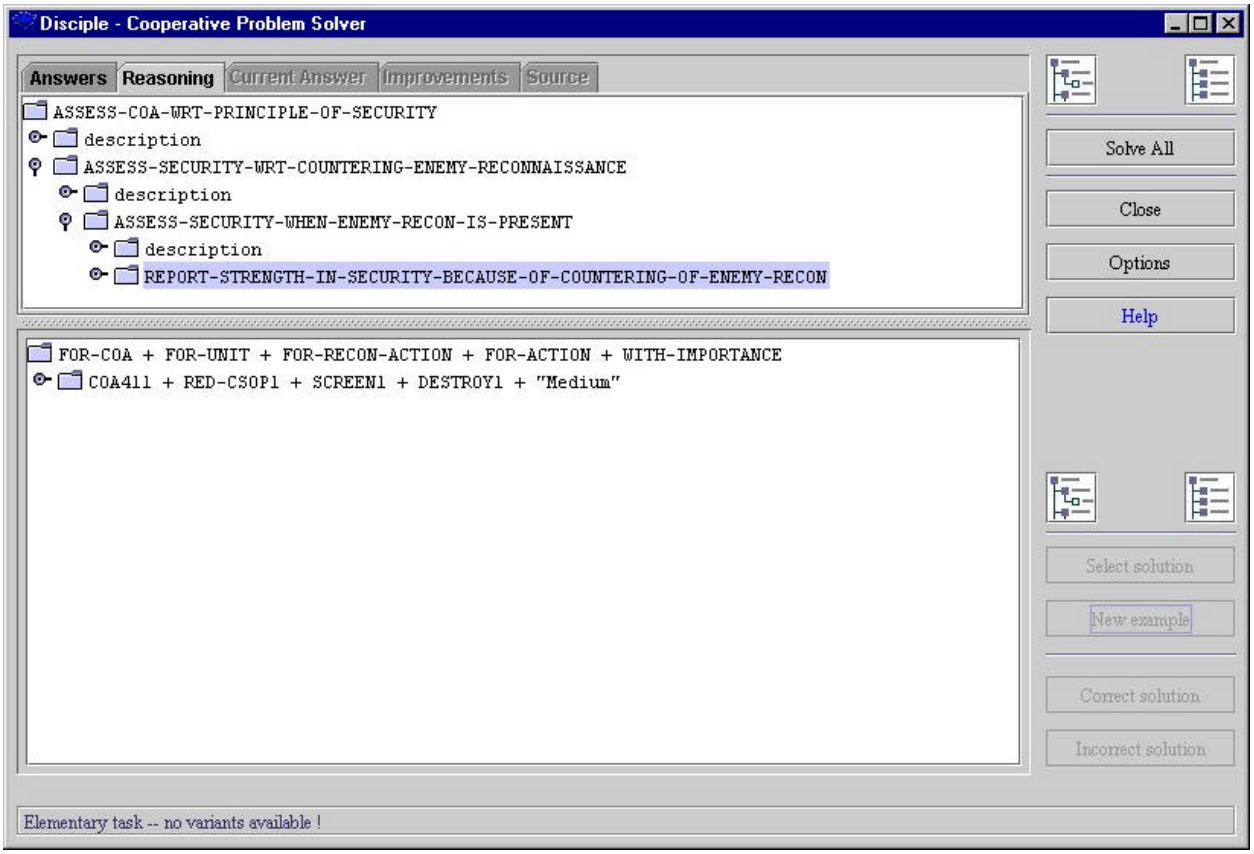


We accept this explanation by clicking on it, and then on the "Accept" button.

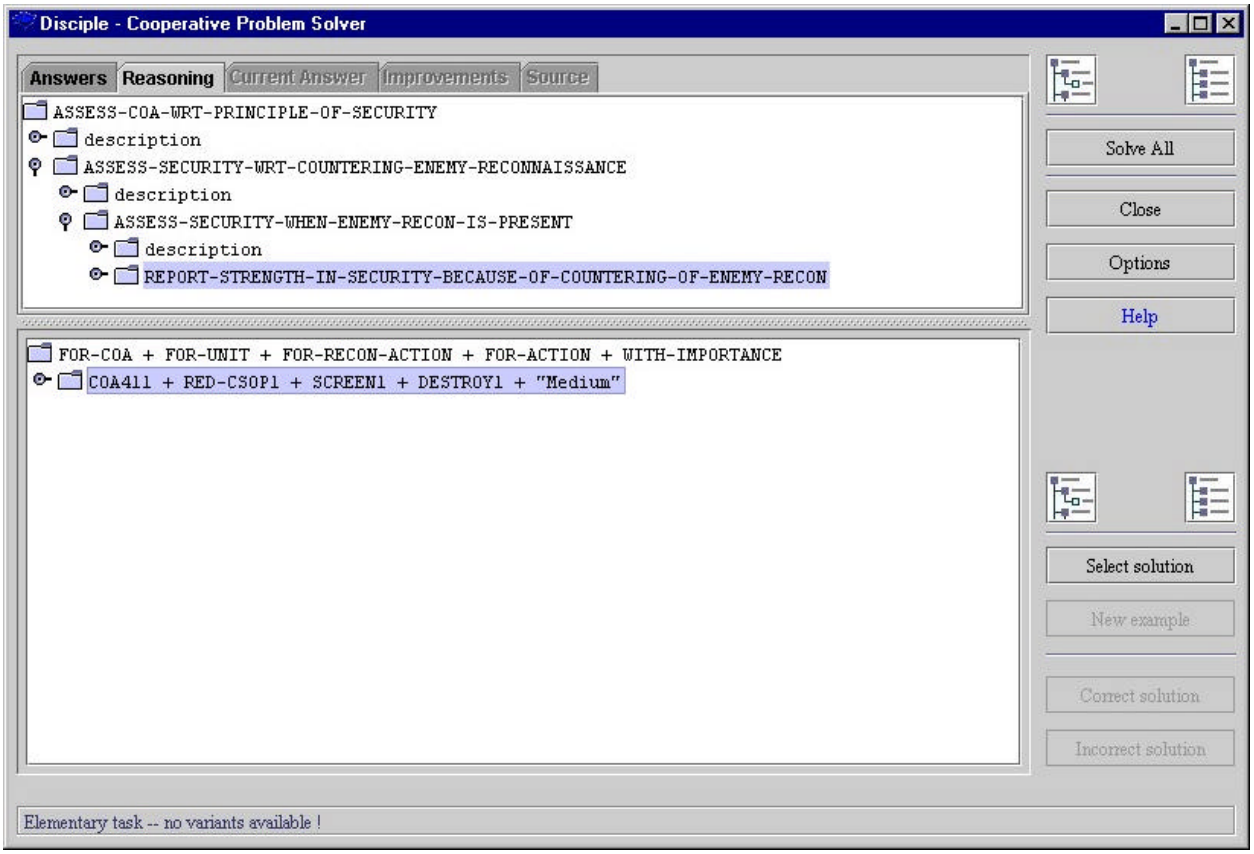
These are all the explanations that are necessary for this current example.



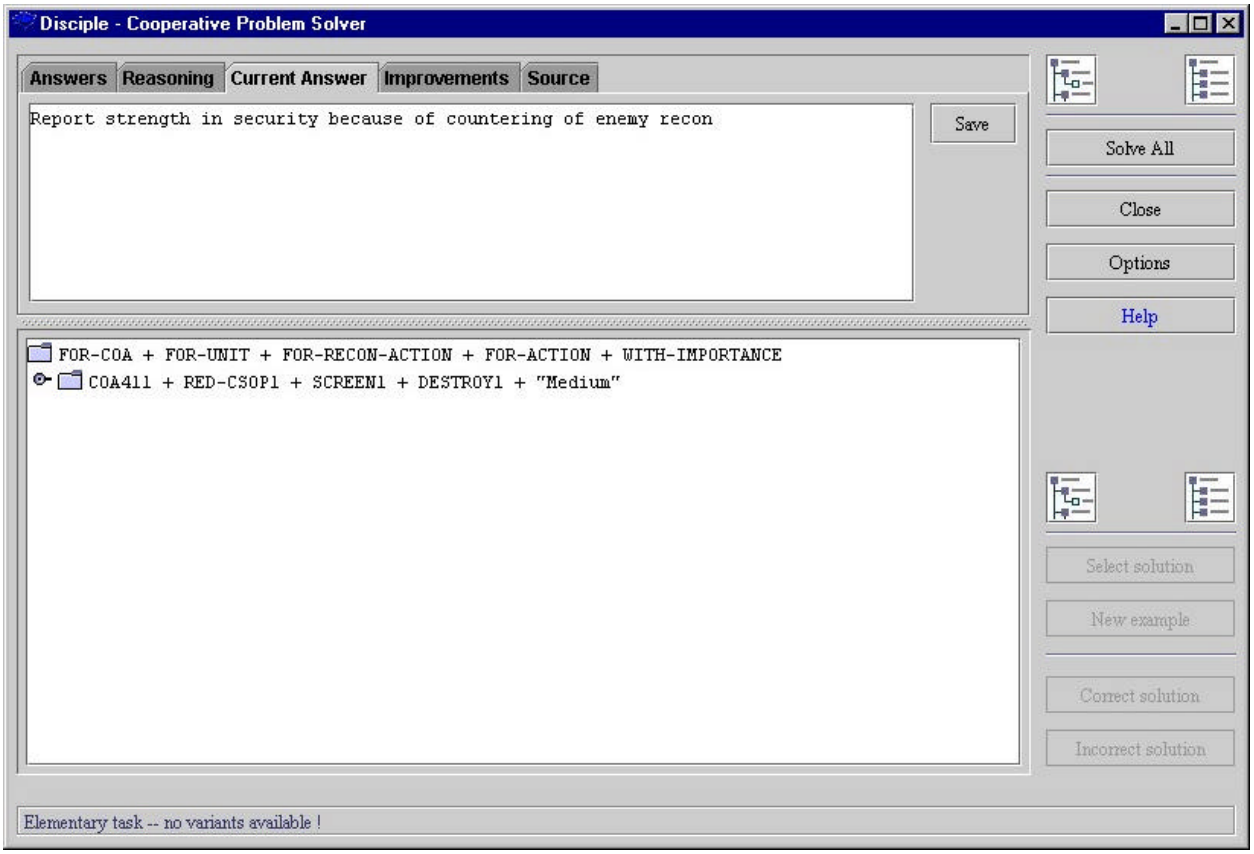
Click on “Close”. At this point Disciple generates a rule based on this example and its explanations, will introduce it in the KB, and will return to the Cooperative Problem Solver.



Notice that the Cooperative Problem Solver window shows the reduction indicated by us in the top pane. It recognizes "REPORT-STRENGTH-IN-SECURITY-BECAUSE-OF-COUNTERING-ENEMY-RECON" as an elementary task. Therefore, in the bottom pane provides the instance of this task (i.e. the features and their values). If the value of any task feature had been a concept, Disciple would have displayed several solutions in the bottom pane, one for each instance of the concept. Then you would have needed to select one of them. In this case there is only one instance. Click on the line indicating the values of the features.



Now click on “Select solution”. The top pane displays the solution.

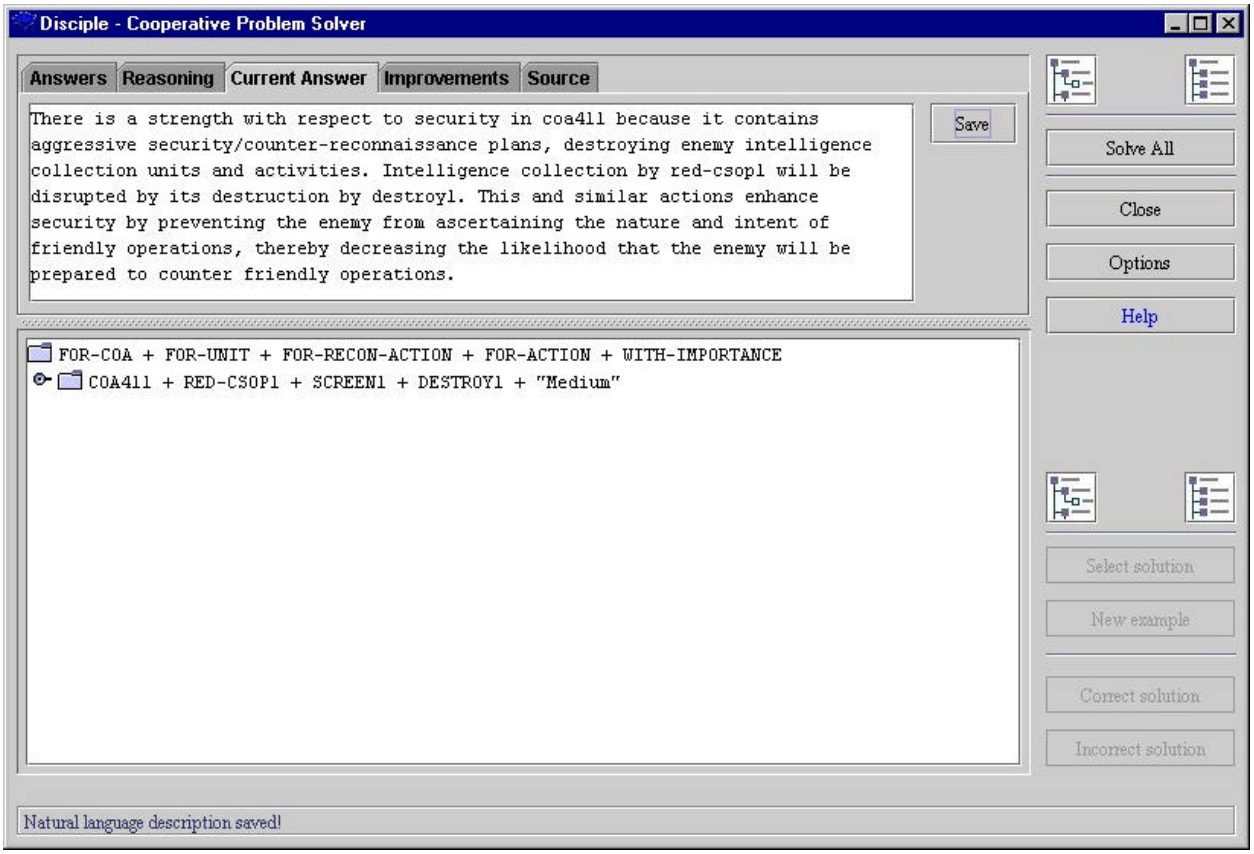


You can edit this text, including in it entities that appear in the bottom window.

Type in the following text:

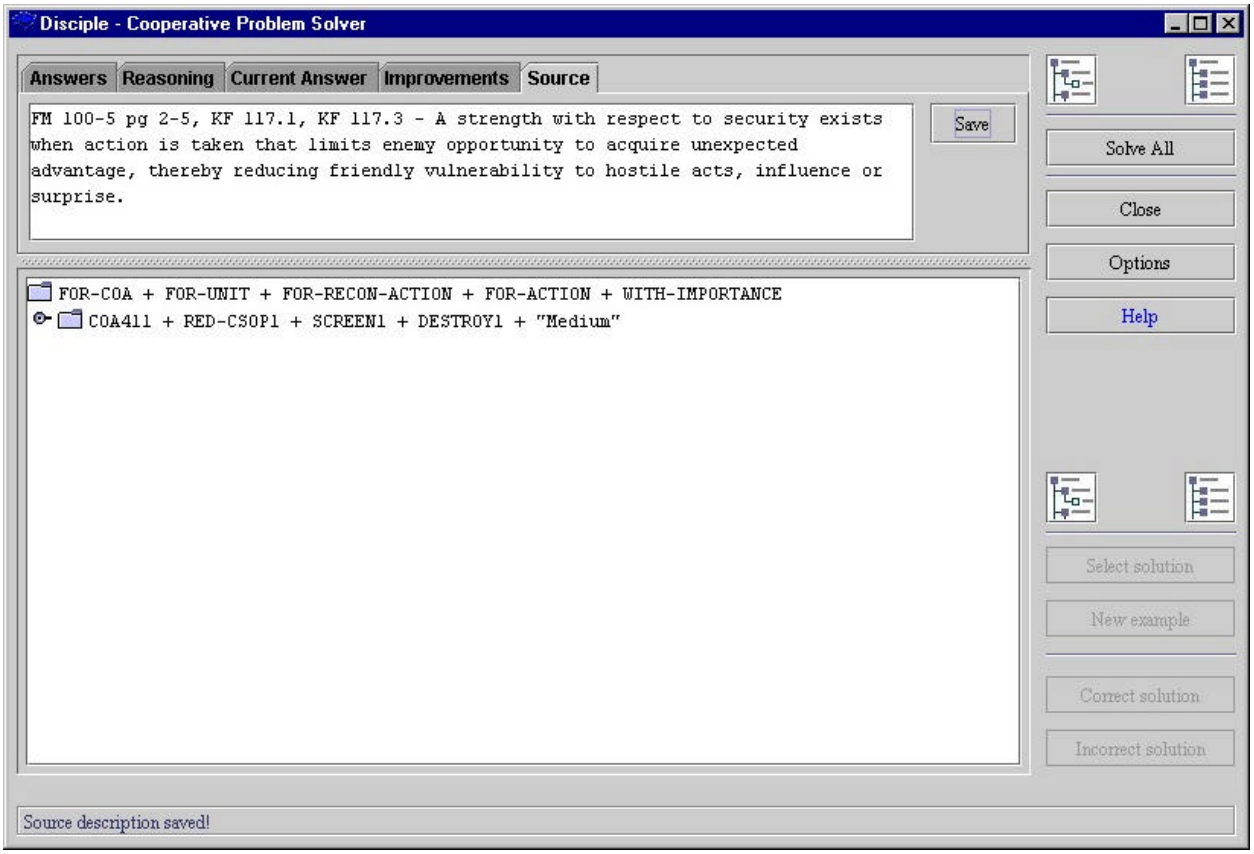
"There is a strength with respect to security in coa411 because it contains aggressive security/counter-reconnaissance plans, destroying enemy intelligence collection units and activities. Intelligence collection by red-csop1 will be disrupted by its destruction by destroy1. This and similar actions enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations."

Then click on "Save".


Disciple - Cooperative Problem Solver
Answers
Reasoning
Current Answer
Improvements
Source
There is a strength with respect to security in coa4ll because it contains aggressive security/counter-reconnaissance plans, destroying enemy intelligence collection units and activities. Intelligence collection by red-csop1 will be disrupted by its destruction by destroy1. This and similar actions enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations.
Save
FOR-COA + FOR-UNIT + FOR-RECON-ACTION + FOR-ACTION + WITH-IMPORTANCE
COA4ll + RED-CSOP1 + SCREEN1 + DESTROY1 + "Medium"
Solve All
Close
Options
Help
Select solution
New example
Correct solution
Incorrect solution
Natural language description saved!

Click on the "Source" tab and then, in the displayed window, insert a natural language text that provides source materials for the answer:

"FM 100-5 pg 2-5, KF 117.1, KF 117.3 - A strength with respect to security exists when action is taken that limits enemy opportunity to acquire unexpected advantage, thereby reducing friendly vulnerability to hostile acts, influence or surprise."


Disciple - Cooperative Problem Solver
Answers
Reasoning
Current Answer
Improvements
Source
FM 100-5 pg 2-5, KF 117.1, KF 117.3 - A strength with respect to security exists when action is taken that limits enemy opportunity to acquire unexpected advantage, thereby reducing friendly vulnerability to hostile acts, influence or surprise.
Save
FOR-COA + FOR-UNIT + FOR-RECON-ACTION + FOR-ACTION + WITH-IMPORTANCE
COA411 + RED-CSOP1 + SCREEN1 + DESTROY1 + "Medium"
Solve All
Close
Options
Help
Select solution
New example
Correct solution
Incorrect solution
Source description saved!

Click on Save.

Then click on “Close” to end the cooperative problem solving session.

Chapter

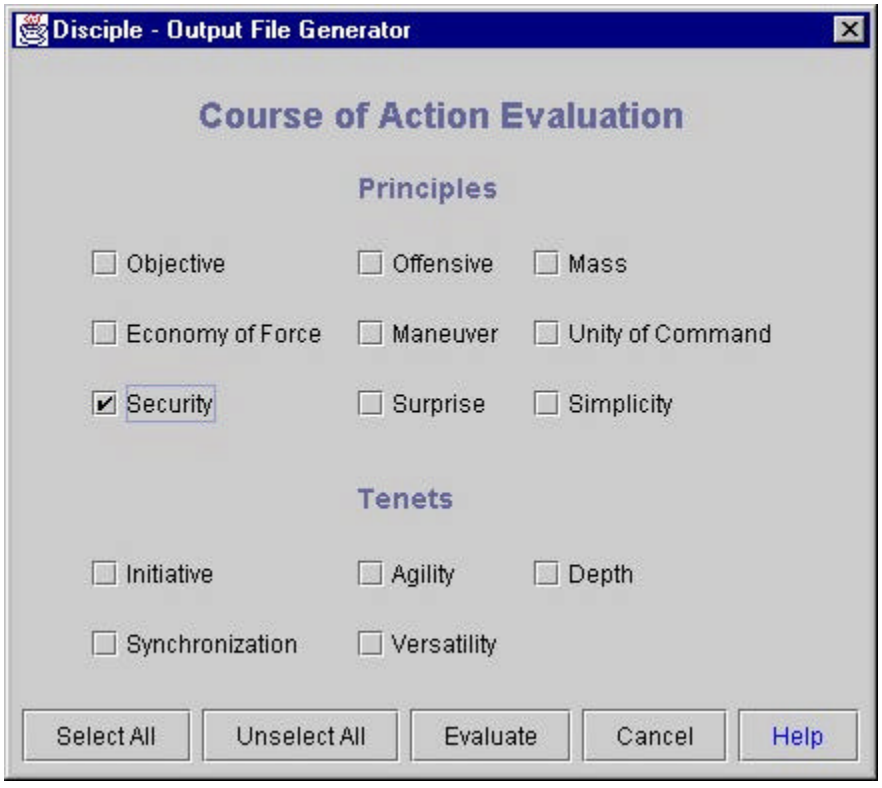
7

Using Disciple as a Problem Solver

Let us now see what Disciple has learned from you. We will ask it to autonomously critique coa411 with respect to the principle of security.

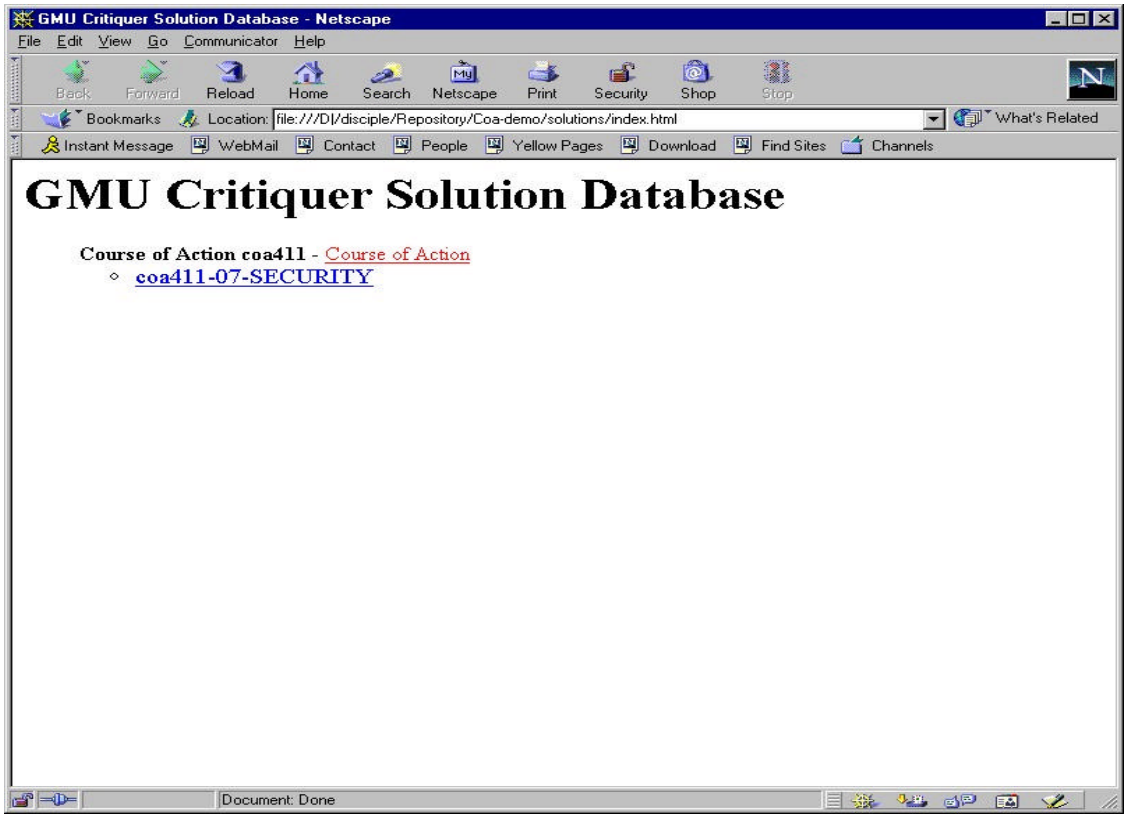
Use the "Disciple Client" window, point to the Solutions menu and select "Generate Solutions".

In the "Disciple – Output File Generator" that is displayed, select "Security".



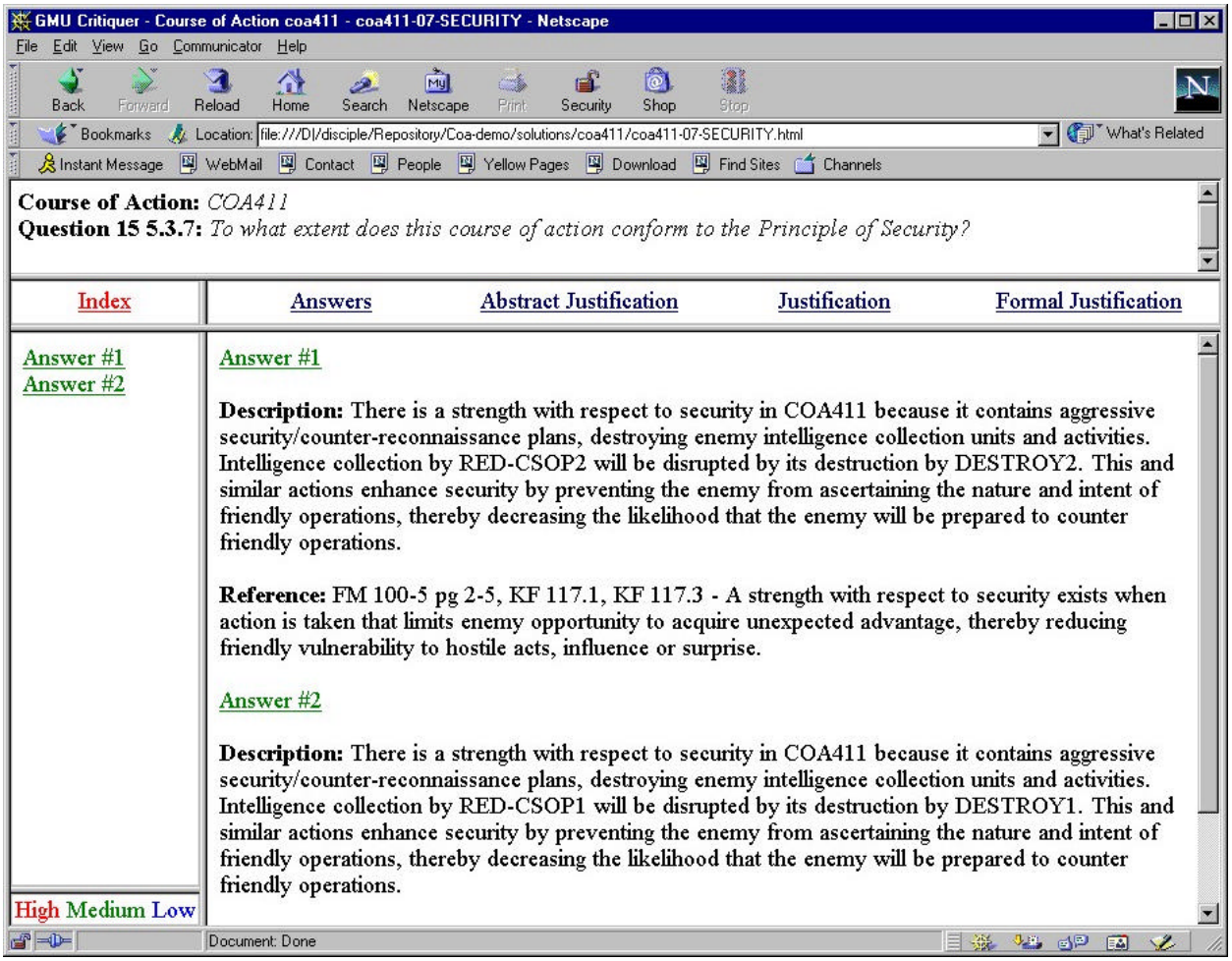
Then click on "Evaluate".

An Internet Explorer window will show the solutions generated for this principle.


GMU Critiquer Solution Database - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/index.html What's Related
Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
GMU Critiquer Solution Database
Course of Action coa411 - Course of Action
coa411-07-SECURITY
Document: Done

Let see them by clicking on “COA411-07-SECURITY”.

A window will appear showing two critiques of coa411 with respect to the principle of security.


GMU Critiquer - Course of Action coa411 - coa411-07-SECURITY - Netscape
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Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/coa411/coa411-07-SECURITY.html What's Related
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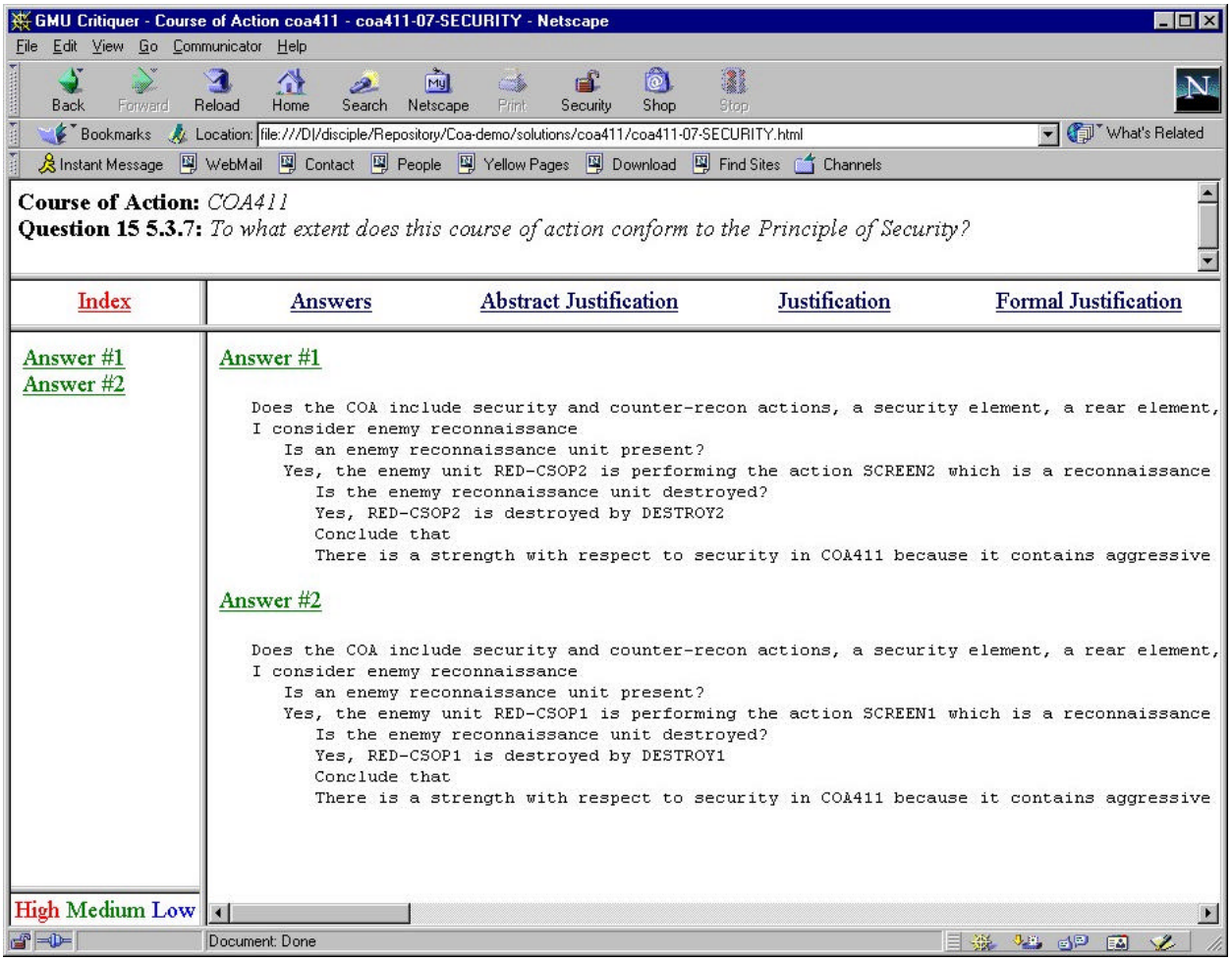
Course of Action: COA411
Question 15 5.3.7: To what extent does this course of action conform to the Principle of Security?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
High Medium Low
Answer #1
Description: There is a strength with respect to security in COA411 because it contains aggressive security/counter-reconnaissance plans, destroying enemy intelligence collection units and activities. Intelligence collection by RED-CSOP2 will be disrupted by its destruction by DESTROY2. This and similar actions enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations.
Reference: FM 100-5 pg 2-5, KF 117.1, KF 117.3 - A strength with respect to security exists when action is taken that limits enemy opportunity to acquire unexpected advantage, thereby reducing friendly vulnerability to hostile acts, influence or surprise.
Answer #2
Description: There is a strength with respect to security in COA411 because it contains aggressive security/counter-reconnaissance plans, destroying enemy intelligence collection units and activities. Intelligence collection by RED-CSOP1 will be disrupted by its destruction by DESTROY1. This and similar actions enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations.
Document: Done

One of the answers corresponds to our teaching session. From that session Disciple learned general rules that allowed it to also provide the second answer. This additional strength corresponds to another enemy reconnaissance unit, RED-CSOP2, which is also destroyed.

Click on "Abstract Justification" to see the justifications of the two identified strengths.


GMU Critiquer - Course of Action coa411 - coa411-07-SECURITY - Netscape
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Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/coa411/coa411-07-SECURITY.html What's Related
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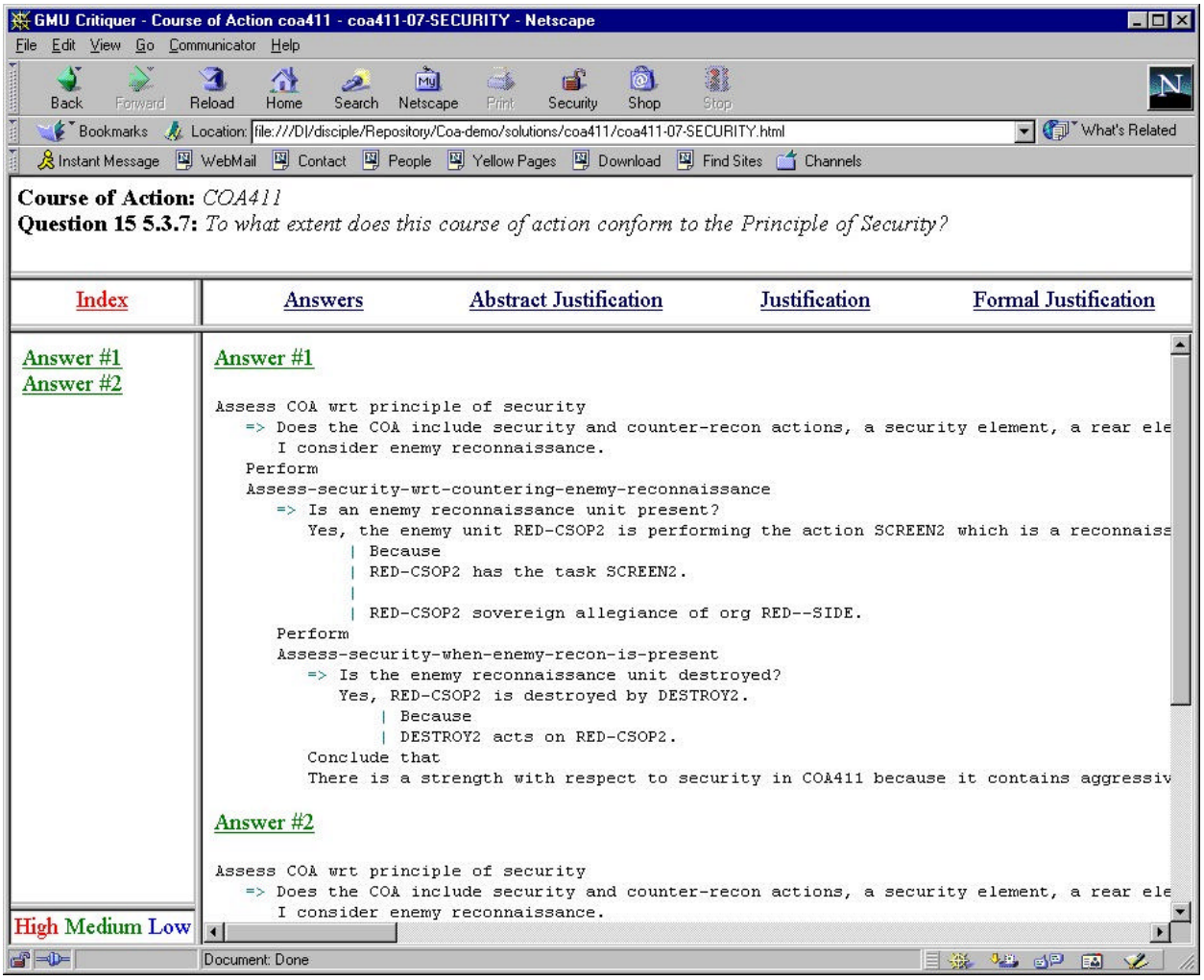
Course of Action: COA411
Question 15 5.3.7: To what extent does this course of action conform to the Principle of Security?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
Answer #1
Does the COA include security and counter-recon actions, a security element, a rear element,
I consider enemy reconnaissance
Is an enemy reconnaissance unit present?
Yes, the enemy unit RED-CSOP2 is performing the action SCREEN2 which is a reconnaissance
Is the enemy reconnaissance unit destroyed?
Yes, RED-CSOP2 is destroyed by DESTROY2
Conclude that
There is a strength with respect to security in COA411 because it contains aggressive
Answer #2
Does the COA include security and counter-recon actions, a security element, a rear element,
I consider enemy reconnaissance
Is an enemy reconnaissance unit present?
Yes, the enemy unit RED-CSOP1 is performing the action SCREEN1 which is a reconnaissance
Is the enemy reconnaissance unit destroyed?
Yes, RED-CSOP1 is destroyed by DESTROY1
Conclude that
There is a strength with respect to security in COA411 because it contains aggressive
High Medium Low
Document: Done

You can notice that these justifications consist of the sequences of questions and answers that guided your reductions. Notice also how they have been used for RED-CSOP2 as well.

Click on "Justification" to see more detailed justifications that also include the intermediate tasks and the explanations.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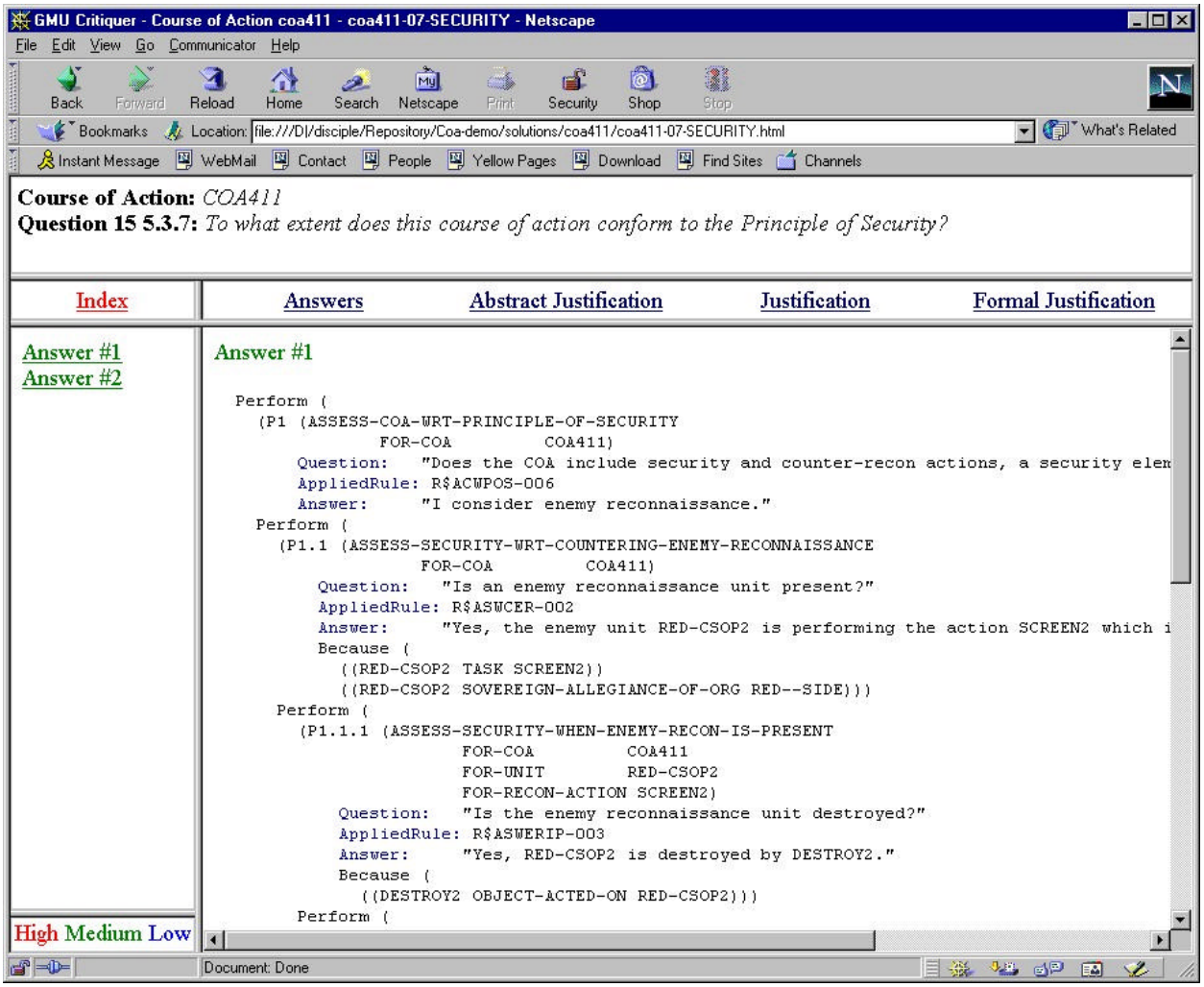
Course of Action: COA411
Question 15 5.3.7: To what extent does this course of action conform to the Principle of Security?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
Answer #1
Assess COA wrt principle of security
=> Does the COA include security and counter-recon actions, a security element, a rear ele
I consider enemy reconnaissance.
Perform
Assess-security-wrt-countering-enemy-reconnaissance
=> Is an enemy reconnaissance unit present?
Yes, the enemy unit RED-CSOP2 is performing the action SCREEN2 which is a reconnais
| Because
| RED-CSOP2 has the task SCREEN2.
|
| RED-CSOP2 sovereign allegiance of org RED--SIDE.
Perform
Assess-security-when-enemy-recon-is-present
=> Is the enemy reconnaissance unit destroyed?
Yes, RED-CSOP2 is destroyed by DESTROY2.
| Because
| DESTROY2 acts on RED-CSOP2.
Conclude that
There is a strength with respect to security in COA411 because it contains aggressiv
Answer #2
Assess COA wrt principle of security
=> Does the COA include security and counter-recon actions, a security element, a rear ele
I consider enemy reconnaissance.
High Medium Low
Document: Done

Click on “Formal justification” to see an even more complete justification.


GMU Critiquer - Course of Action coa411 - coa411-07-SECURITY - Netscape
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Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
Course of Action: COA411
Question 15 5.3.7: To what extent does this course of action conform to the Principle of Security?
Index
Answers
Abstract Justification
Justification
Formal Justification
Answer #1
Answer #2
Answer #1
Perform (
(P1 (ASSESS-COA-WRT-PRINCIPLE-OF-SECURITY
FOR-COA COA411)
Question: "Does the COA include security and counter-recon actions, a security elem
AppliedRule: R$ACWPOS-006
Answer: "I consider enemy reconnaissance."
Perform (
(P1.1 (ASSESS-SECURITY-WRT-COUNTERING-ENEMY-RECONNAISSANCE
FOR-COA COA411)
Question: "Is an enemy reconnaissance unit present?"
AppliedRule: R$ASWCER-002
Answer: "Yes, the enemy unit RED-CSOP2 is performing the action SCREEN2 which i
Because (
((RED-CSOP2 TASK SCREEN2))
((RED-CSOP2 SOVEREIGN-ALLEGIANCE-OF-ORG RED--SIDE)))
Perform (
(P1.1.1 (ASSESS-SECURITY-WHEN-ENEMY-RECON-IS-PRESENT
FOR-COA COA411
FOR-UNIT RED-CSOP2
FOR-RECON-ACTION SCREEN2)
Question: "Is the enemy reconnaissance unit destroyed?"
AppliedRule: R$ASWERIP-003
Answer: "Yes, RED-CSOP2 is destroyed by DESTROY2."
Because (
((DESTROY2 OBJECT-ACTED-ON RED-CSOP2)))
Perform (
High Medium Low
Document: Done

You can now close the Internet Explorer window that displays the solutions.

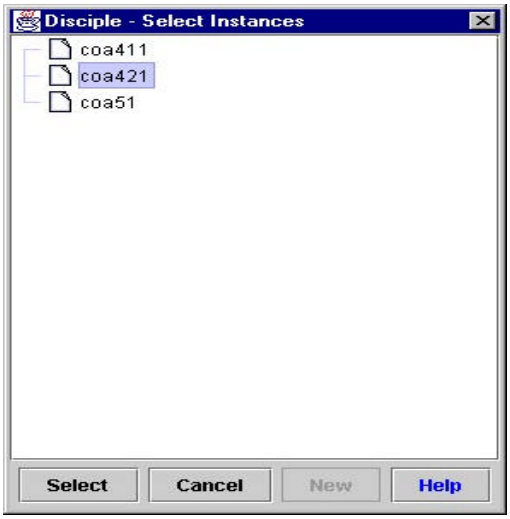
Chapter

8

Loading a Problem Description into the Knowledge Base

Let us now load a new COA, COA421.

In the Disciple Client window click on "Agent/Load instances". The "Select Instances" window will be displayed. Click on coa421 and then on "Select".



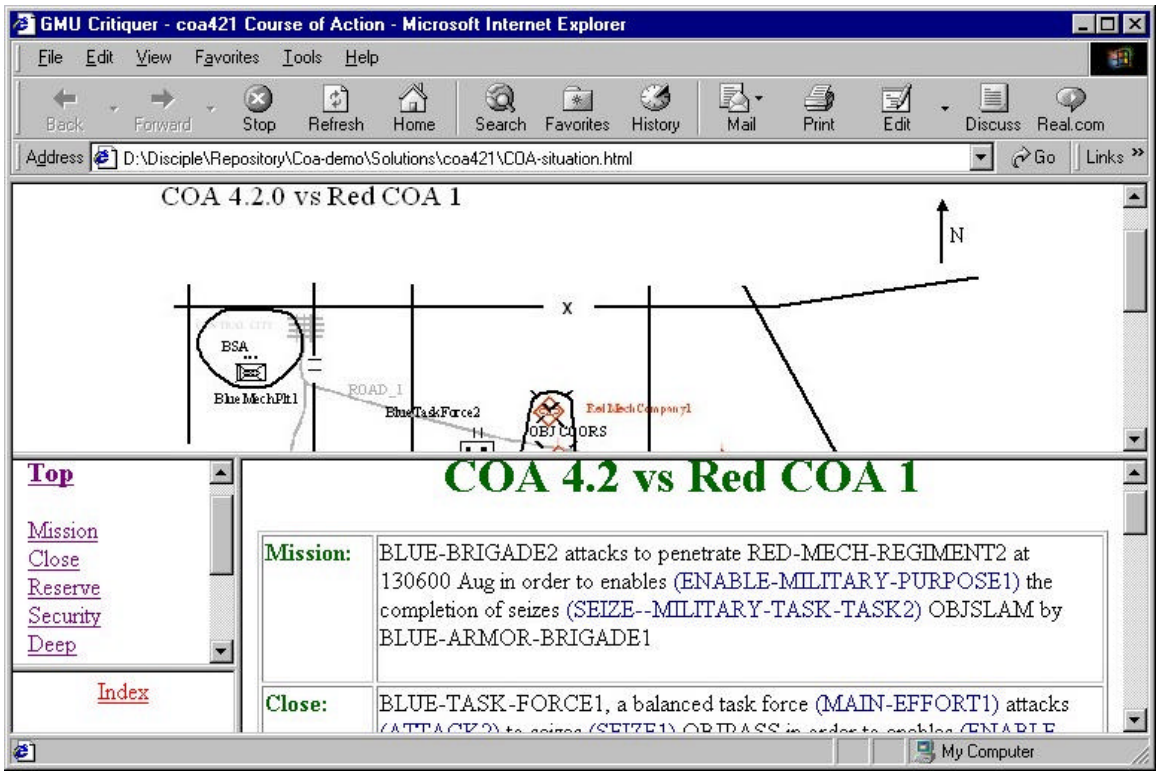
At this point, the instances corresponding to coa411 have been deleted from the KB and those corresponding to coa421 have been loaded.

Chapter

9

Viewing the Input Problem

To view coa421 use the "Disciple Client" window and from the "Solutions" menu select "Input Problem Viewer". An Internet Explorer window will appear that contains the description of coa421. As in the case of coa411, the description of coa421 contains two pieces of information, a sketch and a statement.



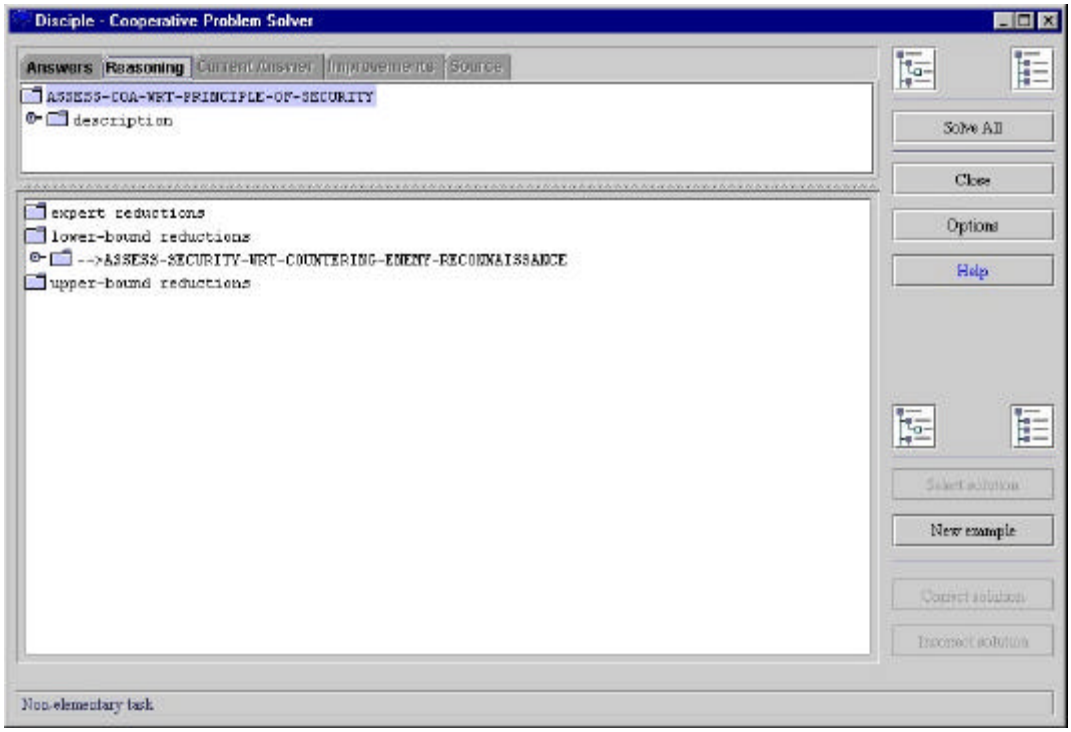
Chapter

10

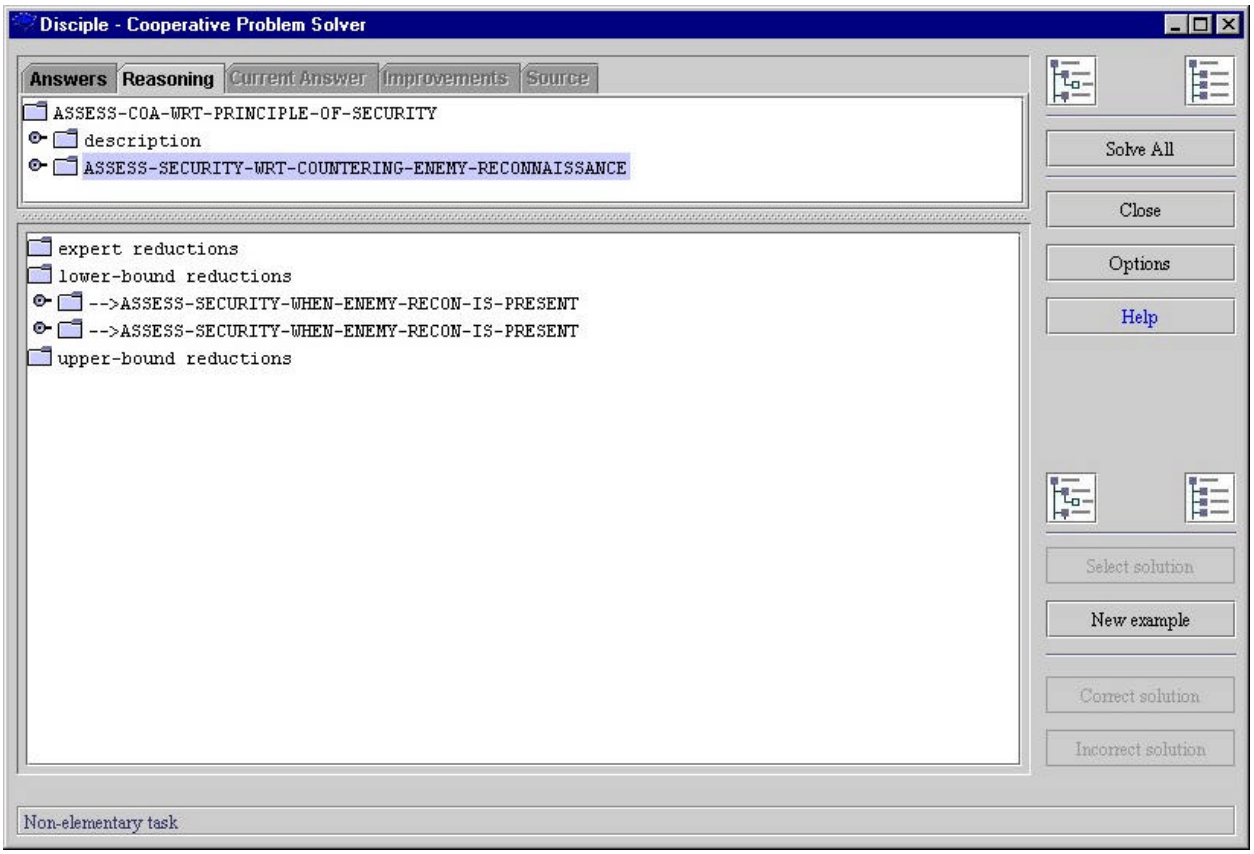
Interacting with the Cooperative Problem Solver to Critique coa421

Let us now invoke the Cooperative Problem Solver to critique coa421 with respect to the principle of security. In the "Disciple Client" window, from the "Tools" menu select "Problem Solver". A window will appear that will allow us to select the problem we would like to solve. Select "List all" and Disciple will list all the 14 predefined problems, one for each principle or tenet. In the displayed list click on "P$07-SECURITY" and then on the "Select" button. This will invoke the Cooperative problem solver with the predefined problem: "ASSESS-COA-WRT-PRINCIPLE-OF-SECURITY"

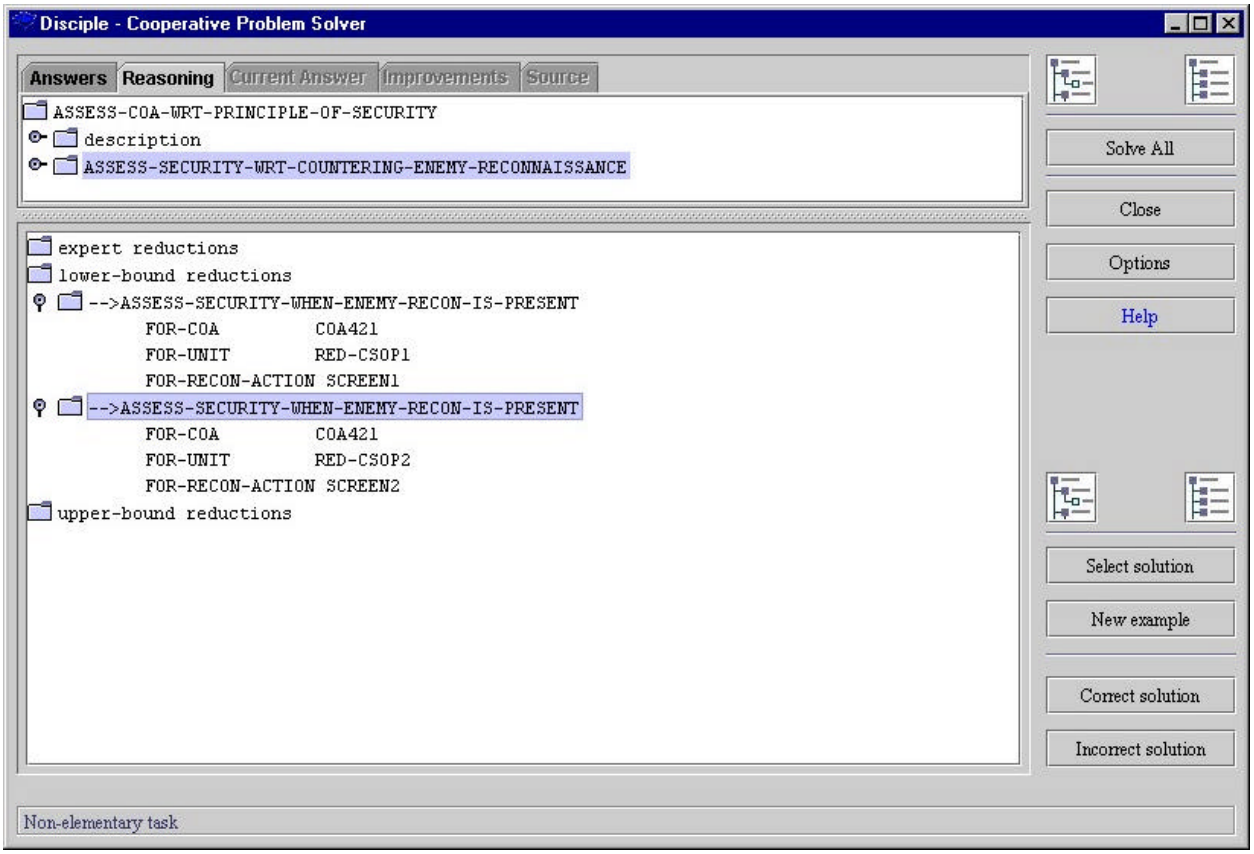
This time Disciple was able to propose a reduction of this problem, by applying a rule learned in the context of coa411.



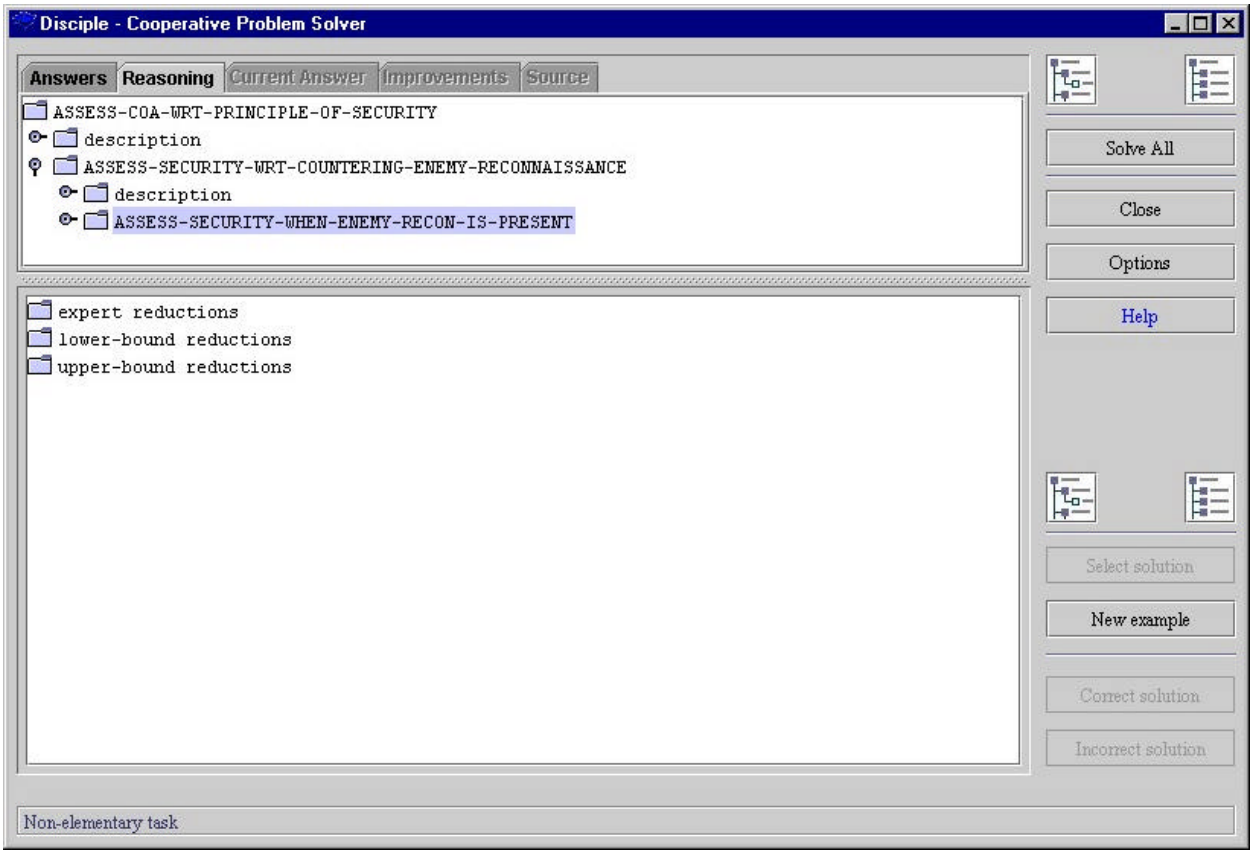
This reduction is correct. Click on it and then on “Select solution”.



The selected task was moved in the top pane and Disciple proposed two reductions of this task, again by applying a rule learned while critiquing coa411. To see the entire descriptions of these tasks double-click on them or on the tree-like button on their right.



There are two reductions because there are two enemy recon units in coa421: red-csop1 and red-csop2. They happen to have the same names as in coa411, but this is just a coincidence. Let us first deal with red-csop1. Click on the first solution and then on “Select solution”.



This time Disciple is not able to propose any reduction of the current task and you need to instruct it what to do.

The task is:

Assessing security when enemy recon is present

Is the enemy reconnaissance unit destroyed?

No.

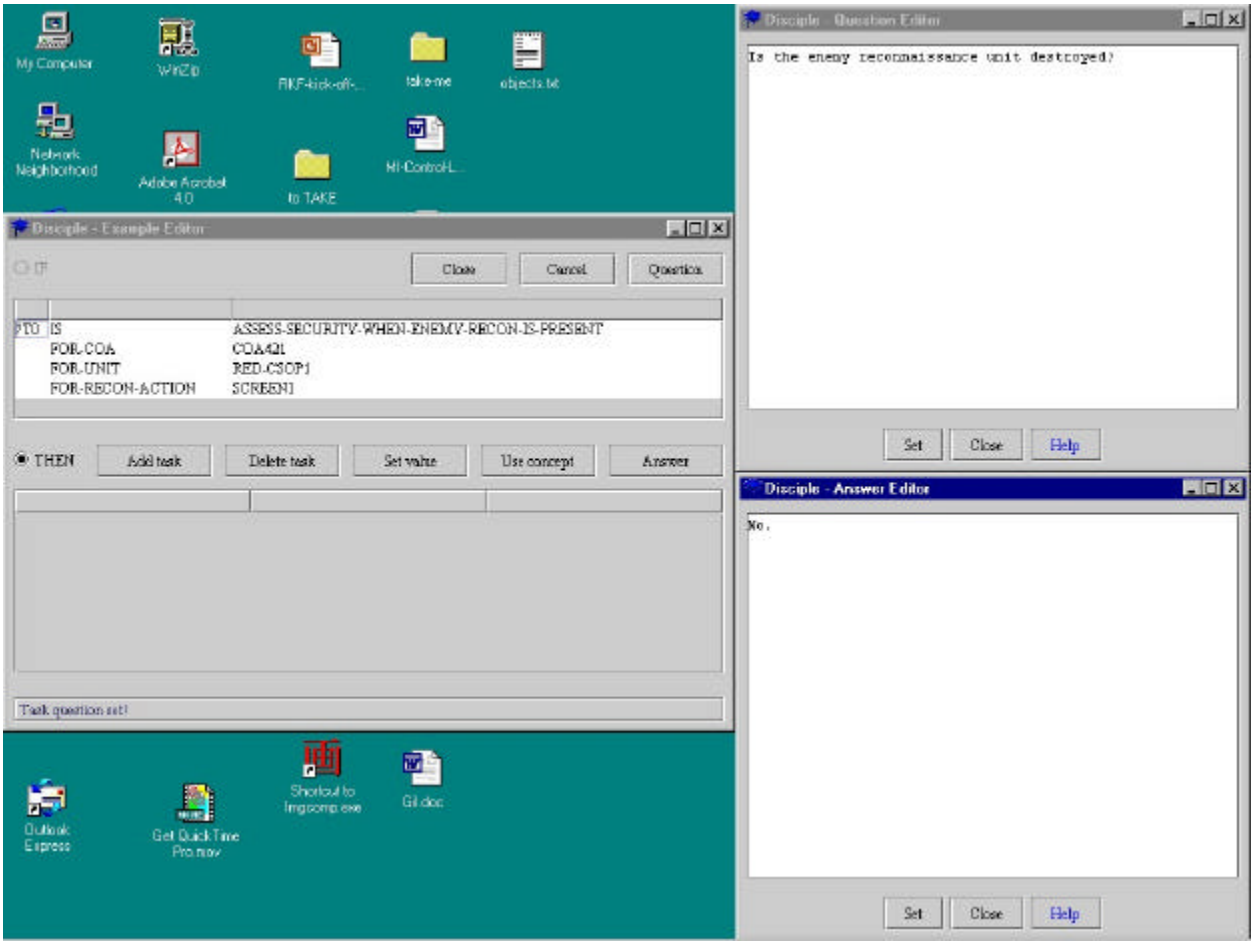
Then report a weakness because enemy recon is not countered.

10.1 Defining a task reduction with the Example Editor

Click on “New example” to define the above reasoning step.

The Example Editor window will be displayed.

Write “No” in the “Answer Editor” window.

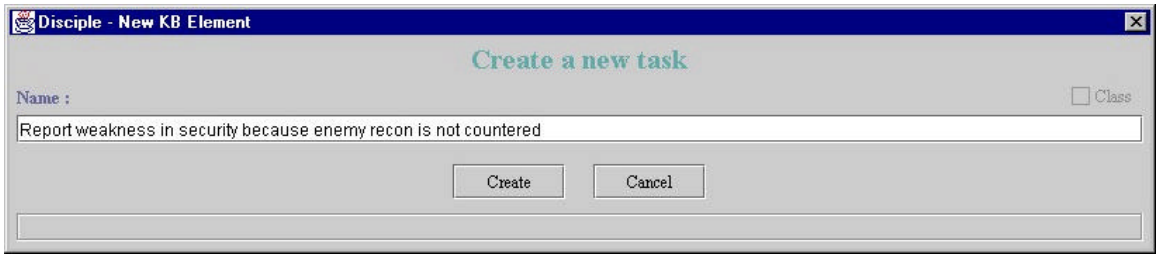


Then click on “Add task” in the Example Editor window.

Click on “New” in the “Filtered selection” window to initiate the definition of a new task.

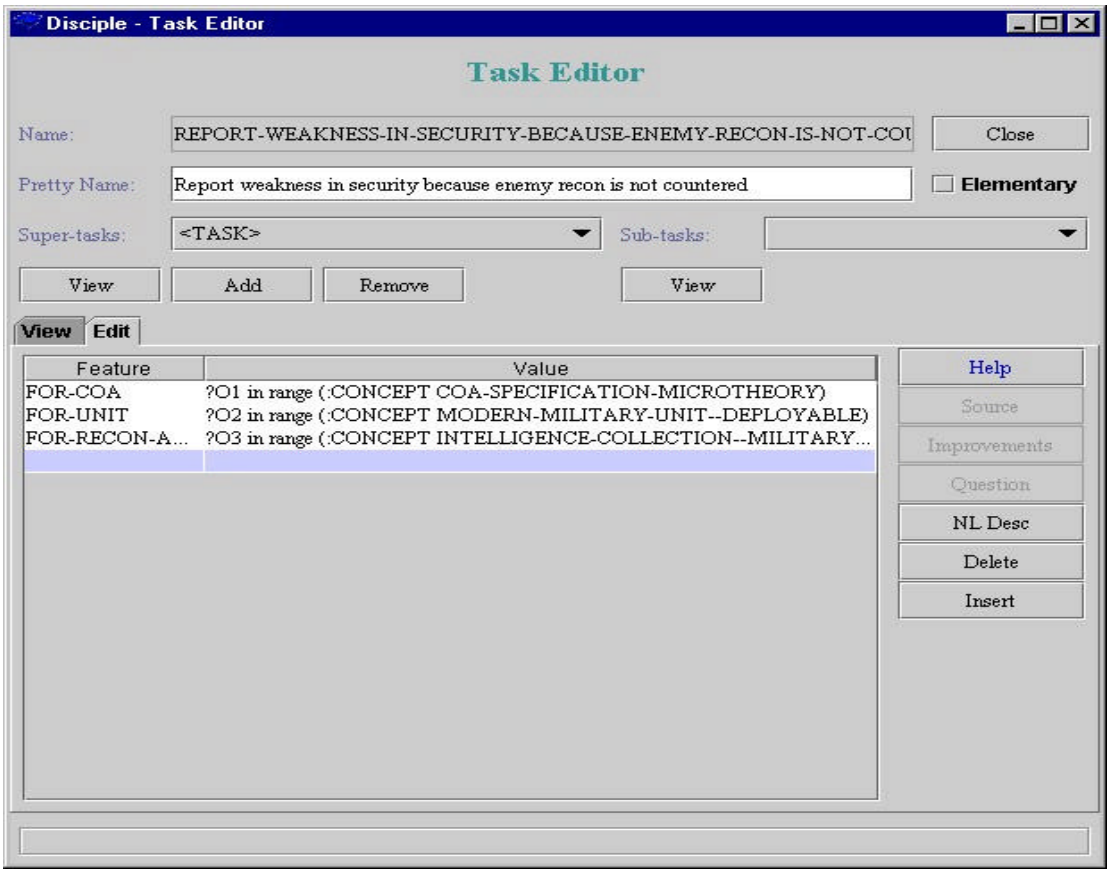
10.1.1 Defining a new task with the Task Editor

Introduce the name of the new task “Report weakness in security because enemy recon is not countered” in the “New KB element” window.



Now click twice on Create.

The Task Editor window will be opened to complete the definition of the task.

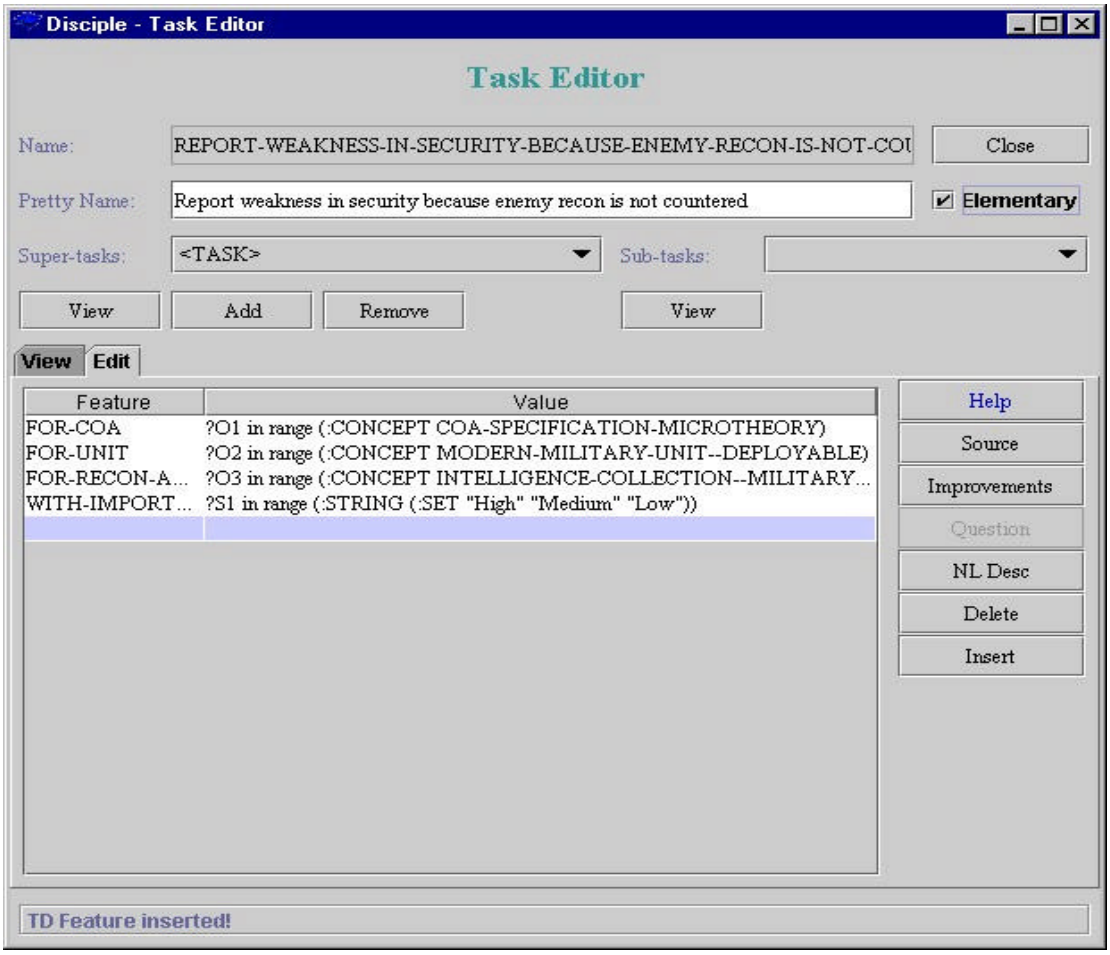


We need to add a feature that will specify the importance of this report and to mark this task as elementary.

Click on “Insert”.

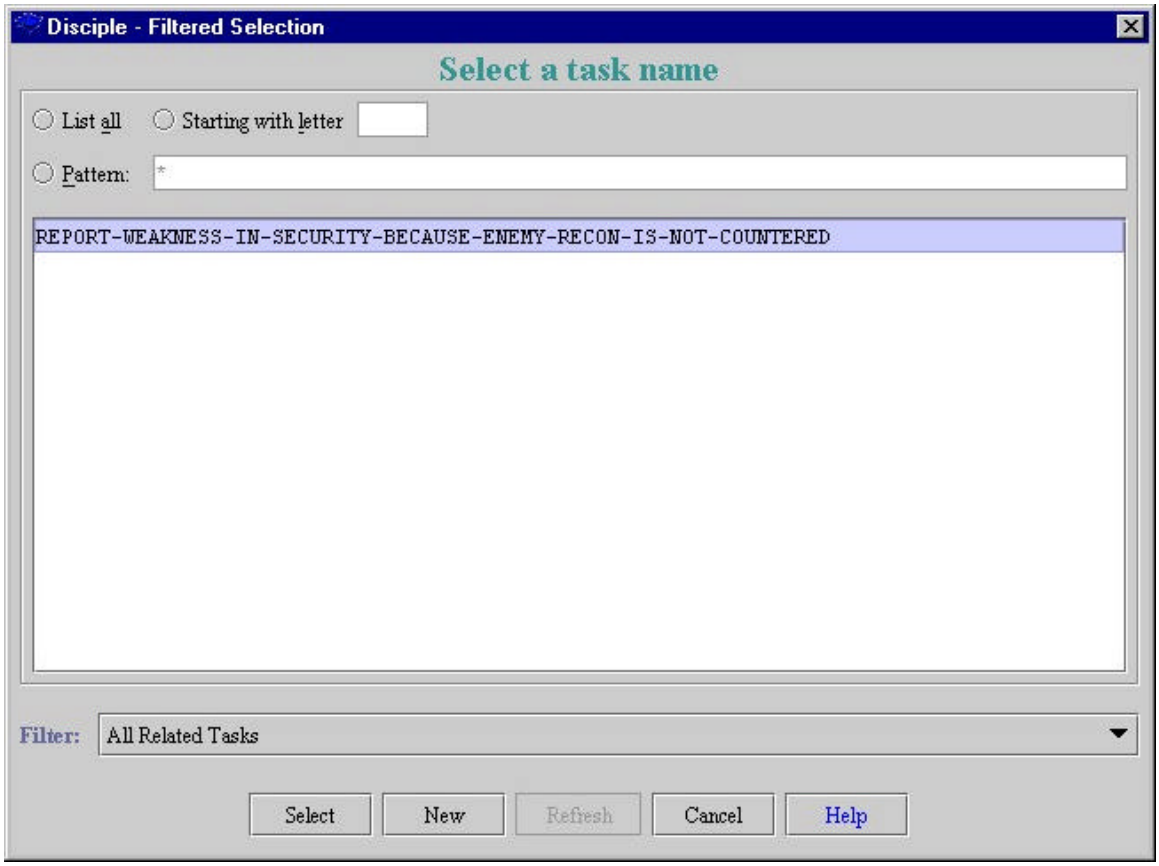
Then, in the “Select possible task description features” press “List all”, scroll down the feature names, click on the “WITH-IMPORTANCE” feature and then on “Select”. The selected feature is added to the task.

Click now on “Elementary”:

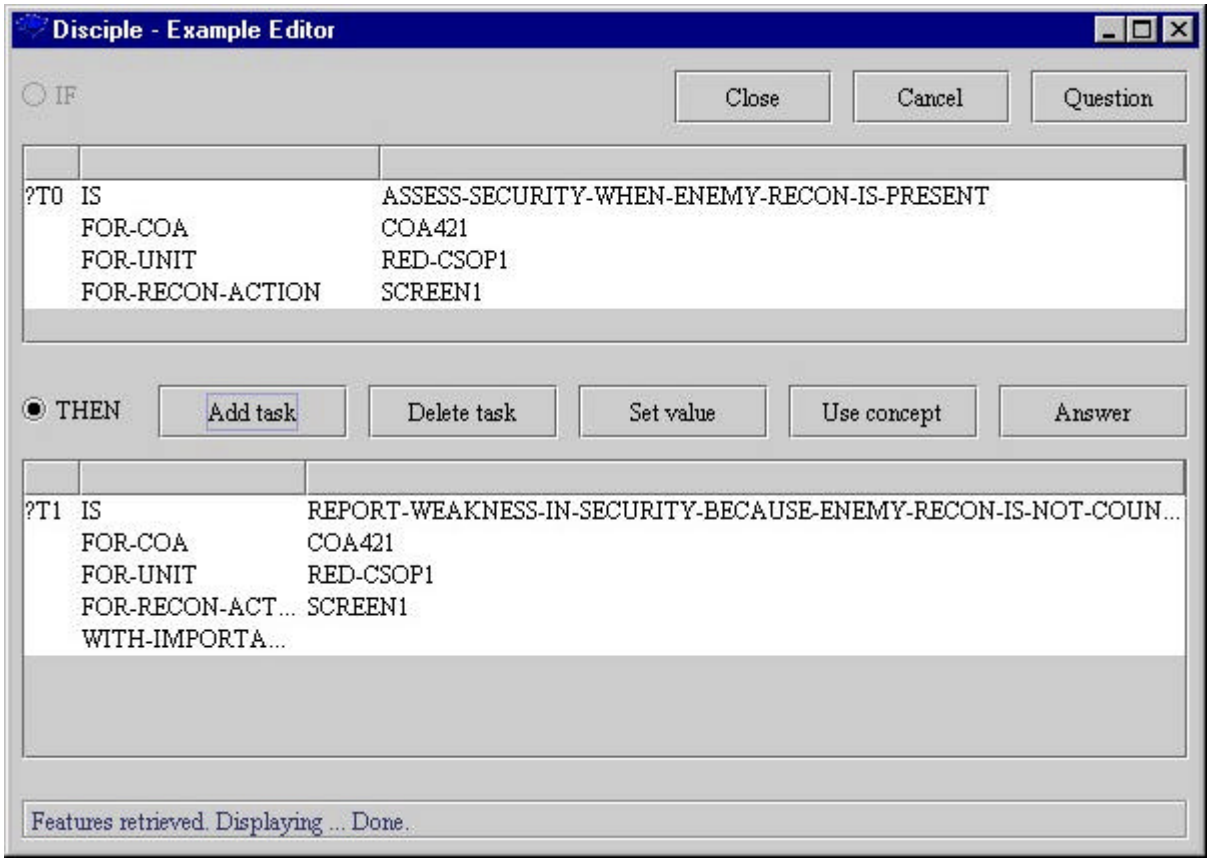


Now the definition of the task is complete. Click on “Close”.

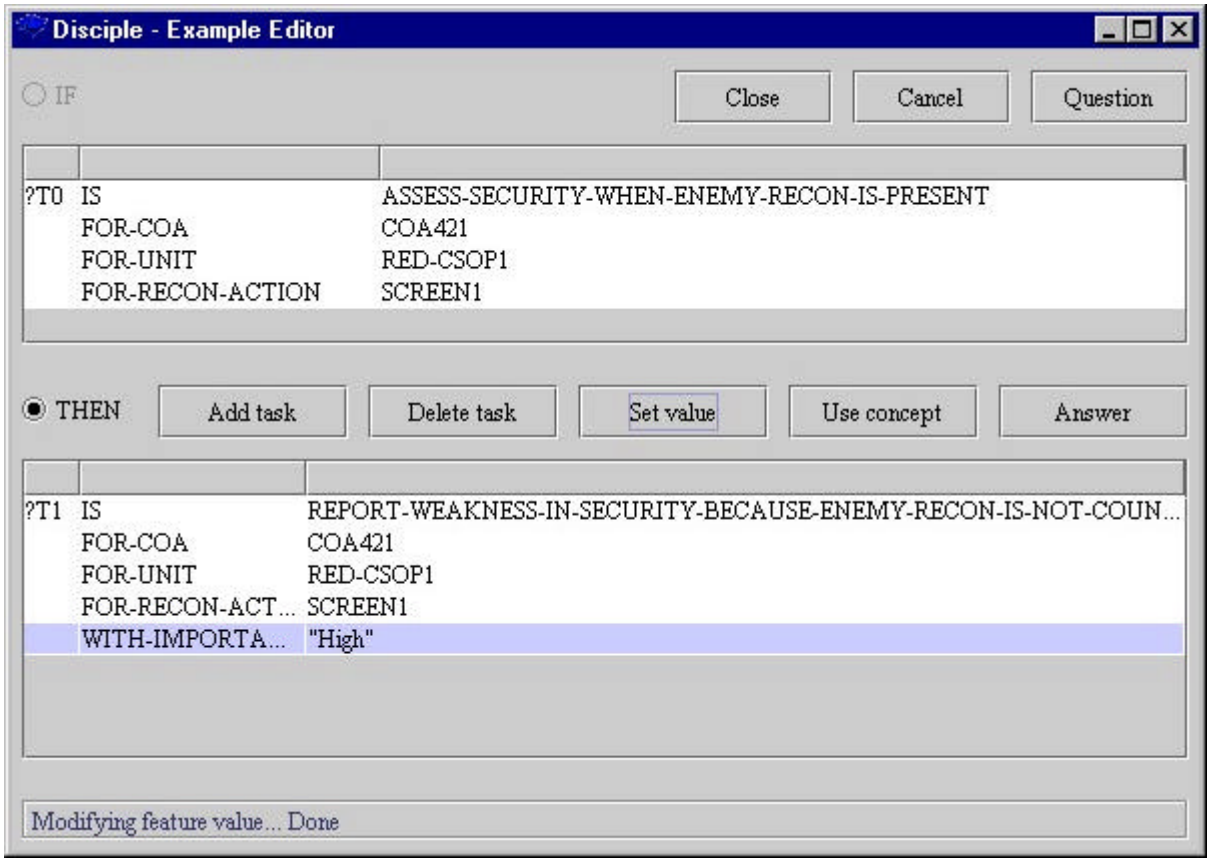
This brings you back to the “Select a task name” window where the defined task is already selected.



Click on "Select". This brings you back to the Example Editor where the new task appears partially instantiated in the bottom pane.



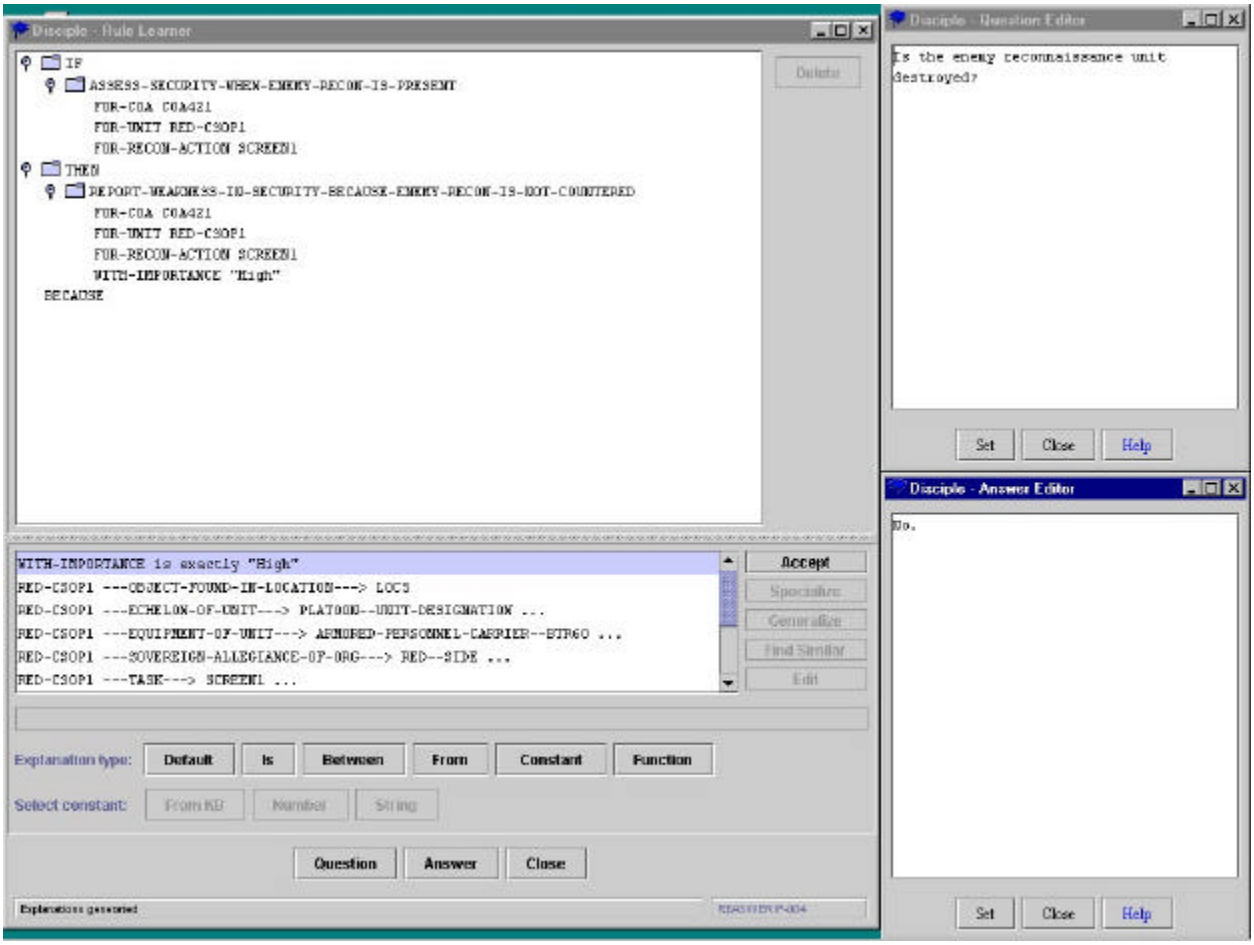
You still need to indicate a value for the last feature. Select it and then click on "Set value". Select the value "High" (or any other value) from the "Select a string value from list" window. Then click on "Select".



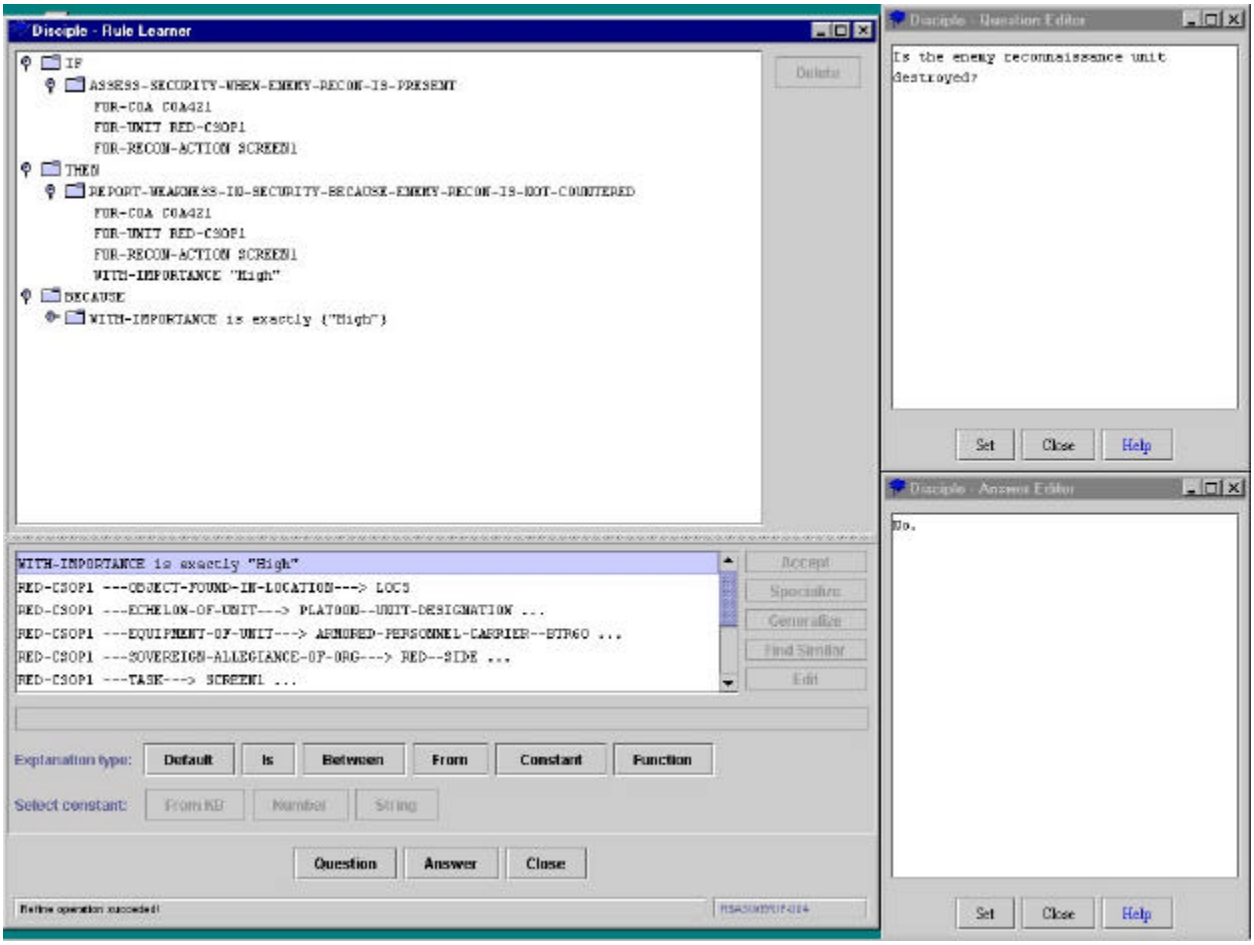
Now the example is completely defined. Click on “Close”.

10.1.2 Interacting with the Rule Learner

The “Rule Learner” is displayed.



The bottom pane contains explanations proposed by Disciple. Accept the first one "WITH-IMPORTANCE is exactly High".



This is the only explanation that we will give Disciple for this task reduction. The other explanation pieces proposed by Disciple are not relevant.

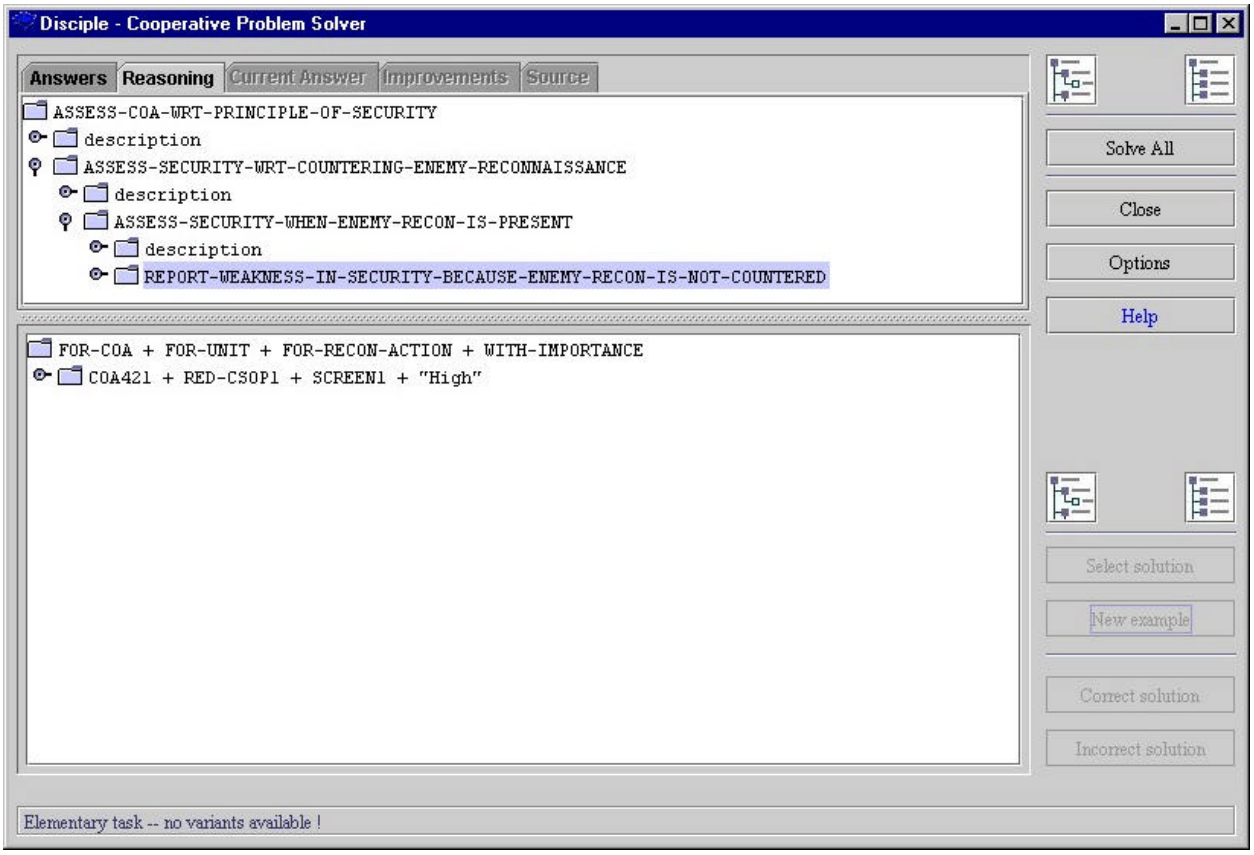
Notice that there is no explanation that states that the enemy recon unit red-csop1 is not destroyed. Disciple cannot propose this explanation because all the explanations that can be proposed are facts that are true in the KB. We know that "the enemy recon unit red-csop1 is not destroyed" because there is no action in coa421 that destroys red-csop1. In this case the explanation would have needed to be something that is missing. This cannot be done in the current version of Disciple. We also consider that it would be too difficult for a subject matter expert to provide such an explanation. The expert would need to formulate a logical expression that would state that it is not true that there is some action ?a which is a destroy action that acts on red-csop1.

What we will do is to let Disciple to learn a very general rule from this task reduction. This rule basically states that if one has to assess security when enemy recon is present then one should report a weakness because the enemy recon is not destroyed. This rule will generate a wrong solution in the situations where the enemy recon is actually destroyed (as was the case in coa411). At that point, however, it will be very easy for Disciple or the expert to explain why the solution is wrong: because there is a destroy action that acts on the enemy recon unit. Therefore Disciple will correct the overly general rule that is learned now.

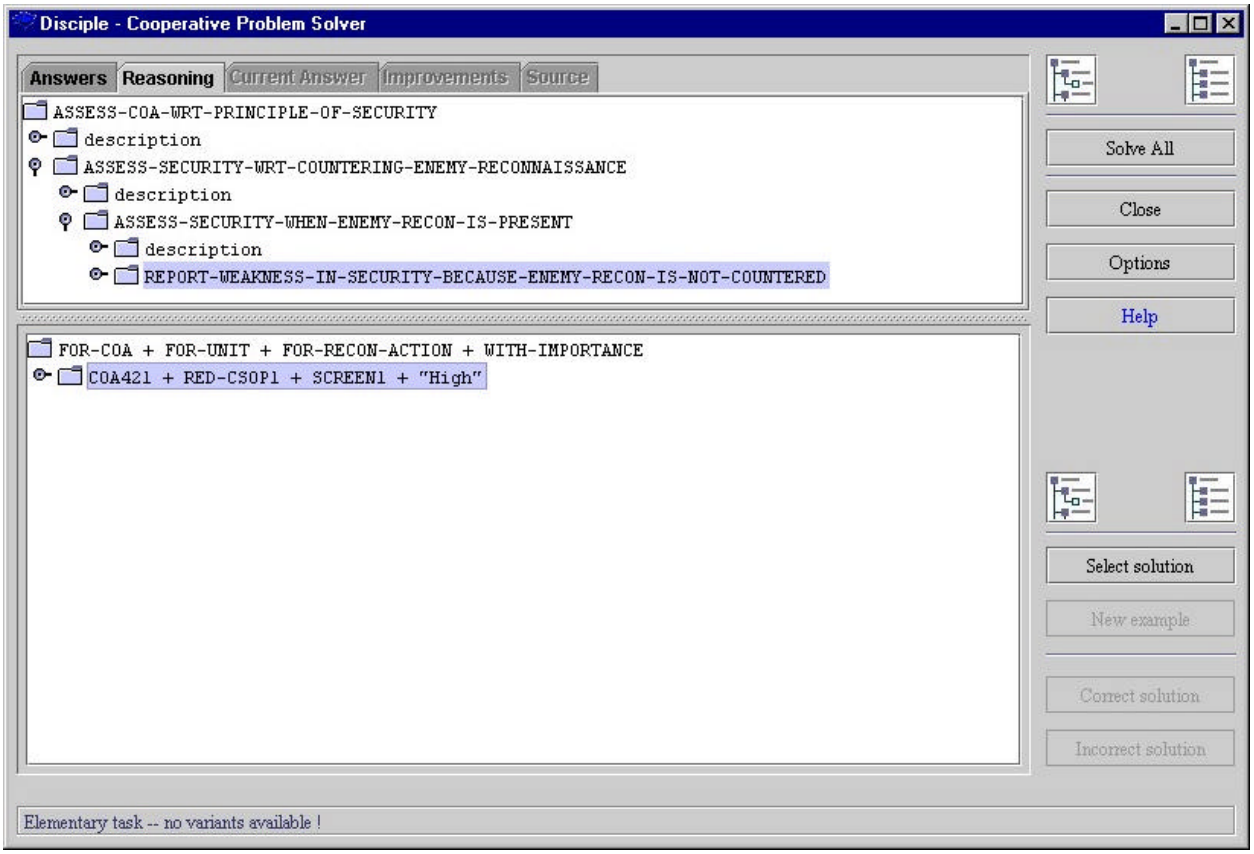
This discussion illustrates another very important feature of Disciple. Namely, that it is not necessary to identify all the explanations of a task reduction. If this is the case (and one would expect this case to happen many times because experts often omit relevant explanations that seem obvious to them), then Disciple will learn an overly general rule that will be refined when it will generate wrong solutions.

Now let us proceed with the demonstration. Click on "Close". This ends the rule learning process.

The "Cooperative Problem Solver" window will be displayed.



In the bottom pane of the Cooperative Problem Solver window, click on the line containing the feature values.

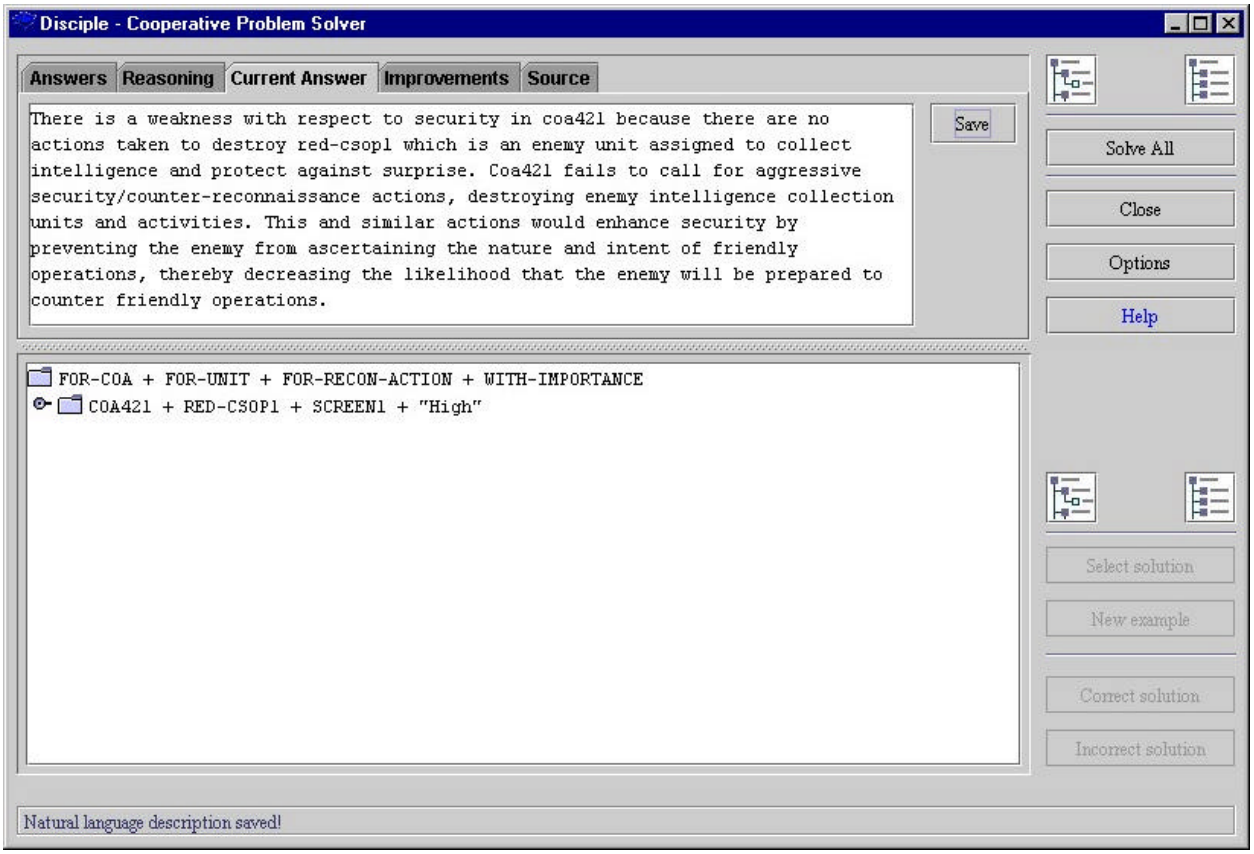


Now click on “Select Solution”.

The top pane will now display the current answer in natural language.

Replace the current text generated by Disciple with a more detailed one that contains also some of the feature values (i.e. coa421, red-csop1, screen1 and High), such as:

“There is a weakness with respect to security in coa421 because there are no actions taken to destroy red-csop1 which is an enemy unit assigned to collect intelligence and protect against surprise. Coa421 fails to call for aggressive security/counter-reconnaissance actions, destroying enemy intelligence collection units and activities. This and similar actions would enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations.”

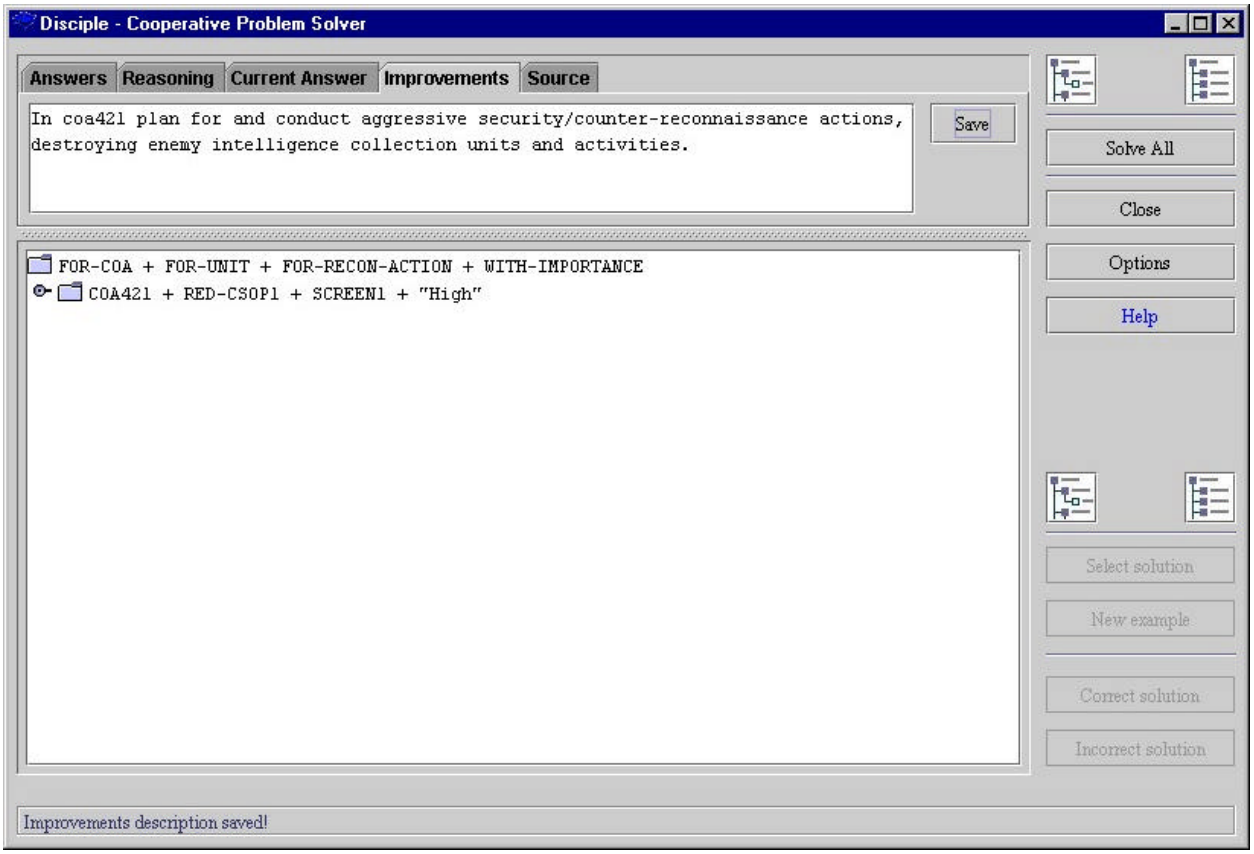

Disciple - Cooperative Problem Solver
Answers
Reasoning
Current Answer
Improvements
Source
There is a weakness with respect to security in coa421 because there are no actions taken to destroy red-csop1 which is an enemy unit assigned to collect intelligence and protect against surprise. Coa421 fails to call for aggressive security/counter-reconnaissance actions, destroying enemy intelligence collection units and activities. This and similar actions would enhance security by preventing the enemy from ascertaining the nature and intent of friendly operations, thereby decreasing the likelihood that the enemy will be prepared to counter friendly operations.
Save
Solve All
Close
Options
Help
FOR-COA + FOR-UNIT + FOR-RECON-ACTION + WITH-IMPORTANCE
COA421 + RED-CSOP1 + SCREEN1 + "High"
Select solution
New example
Correct solution
Incorrect solution
Natural language description saved!

Click on "Save" to associate this description with the solution.

Because this solution is a weakness, we can instruct Disciple to suggest an improvement of the COA.

Click on the "Improvements" tab and introduce the following text in the opened pane:

"In coa421 plan for and conduct aggressive security/counter-reconnaissance actions, destroying enemy intelligence collection units and activities."

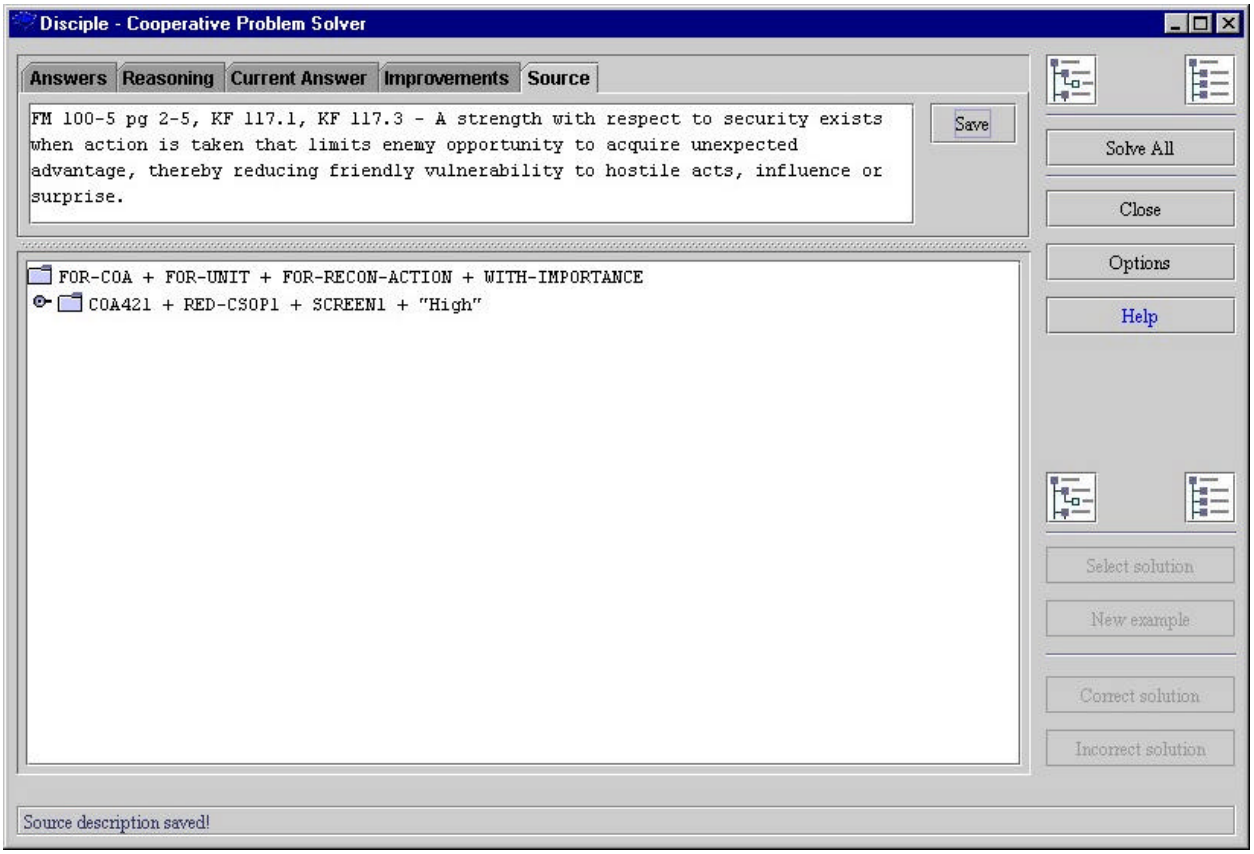


Click on “Save”.

Click on the “Source” tab to provide references for this answer.

Write the following text in the top pane:

“FM 100-5 pg 2-5, KF 117.1, KF 117.3 - A strength with respect to security exists when action is taken that limits enemy opportunity to acquire unexpected advantage, thereby reducing friendly vulnerability to hostile acts, influence or surprise.”


Disciple - Cooperative Problem Solver
Answers
Reasoning
Current Answer
Improvements
Source
FM 100-5 pg 2-5, KF 117.1, KF 117.3 - A strength with respect to security exists when action is taken that limits enemy opportunity to acquire unexpected advantage, thereby reducing friendly vulnerability to hostile acts, influence or surprise.
Save
FOR-COA + FOR-UNIT + FOR-RECON-ACTION + WITH-IMPORTANCE
COA421 + RED-CSOP1 + SCREEN1 + "High"
Solve All
Close
Options
Help
Select solution
New example
Correct solution
Incorrect solution
Source description saved!

Click on “Save”. Then click on “Close” to exit the Cooperative Problem Solver.

In the following sections we will illustrate how the overly general rule that Disciple has just learned will be improved.

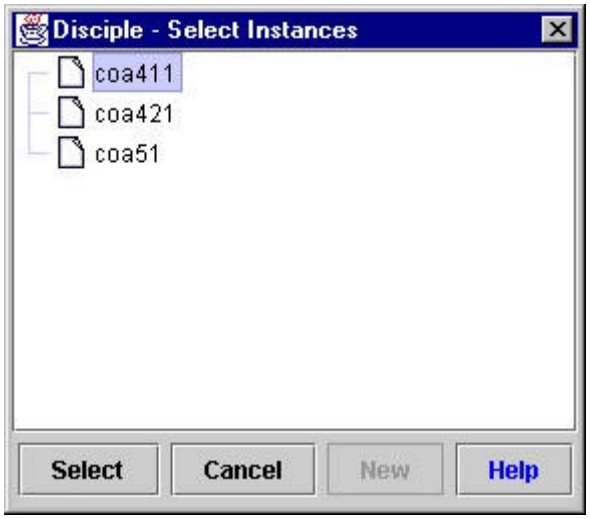
Chapter

11

Loading a Problem Description into the Knowledge Base

Let us load again coa411.

In the Disciple Client window click on "Agent/Load instances". The "Select Instances" window will be displayed. Click on coa411 and then on "Select".



At this point, the instances corresponding to coa421 have been deleted from the KB and those corresponding to coa411 have been loaded.

Chapter

12

Interacting with the Cooperative Problem Solver to Critique coa411

Let us now invoke the Cooperative Problem Solver. In the "Disciple Client" window, from the "Tools" menu, select "Problem Solver". A window will appear that will allow us to select the problem we would like to solve.

Select "List all" and Disciple will list all the 14 predefined problems, one for each principle or tenet.

In the displayed list click on "P$07-SECURITY" and then on the "Select" button. This will invoke the Cooperative problem solver with the predefined task:

"ASSESS-COA-WRT-PRINCIPLE-OF-SECURITY"

Immediately Disciple proposes a reduction of this task to the following task:

"ASSESS-SECURITY-WRT-COUNTERING-ENEMY-RECONNAISSANCE"

Click on it and then on "Select solution".

This reduction will be performed. Then Disciple proposes two alternative reductions of the task:

"ASSESS-SECURITY-WRT-COUNTERING-ENEMY-RECONNAISSANCE"

Click on the tree like button on the right of the "Cooperative Problem Solver" window, to see the complete descriptions of these reductions.

One reduction corresponds to red-csop1 and the other to red-csop2.

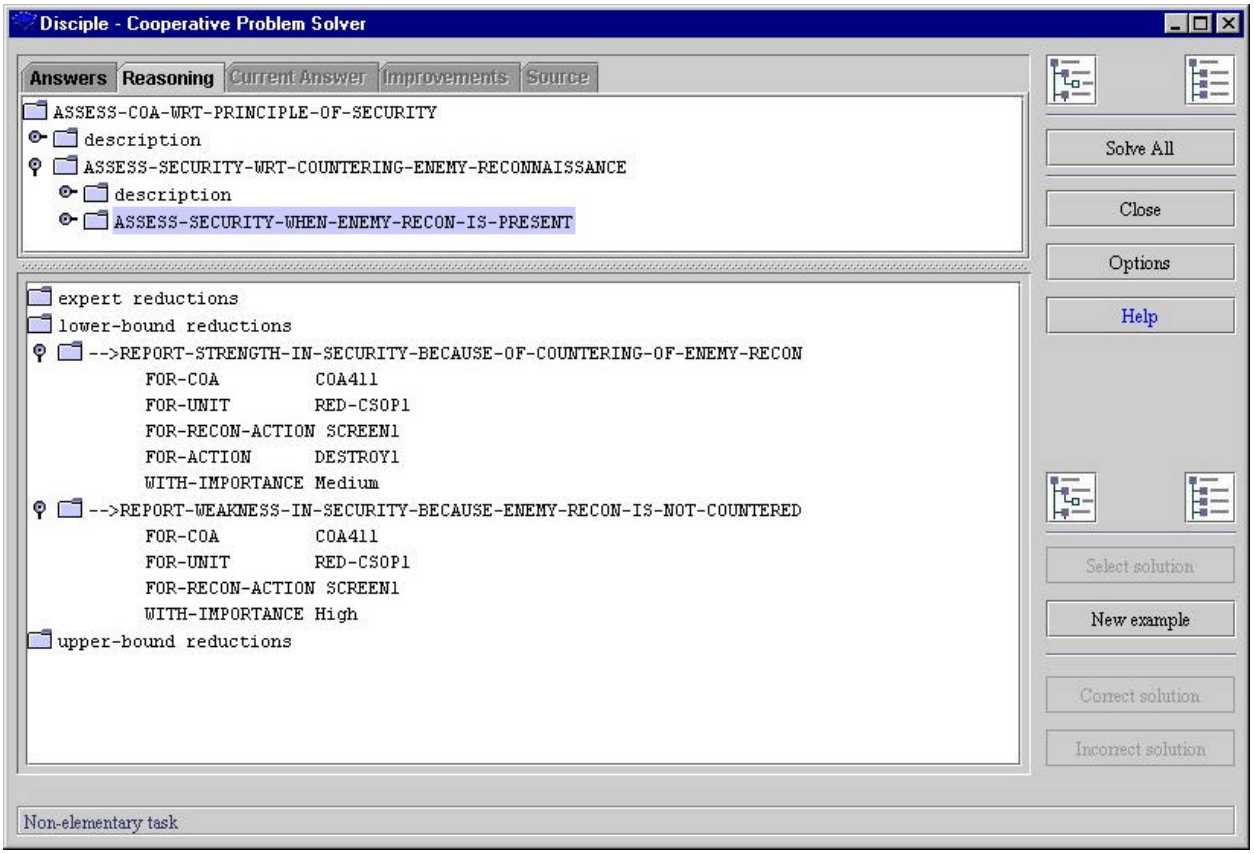
Let us first deal with red-csop1. Click on the first reduction and then on "Select solution".

The task

"Assess-security-when-enemy-recon-is-present"

is moved to the top pane and Disciple immediately proposes two possible reductions.

Click on the tree like button on the right of the "Cooperative Problem Solver" window, to see the complete descriptions of these reductions.



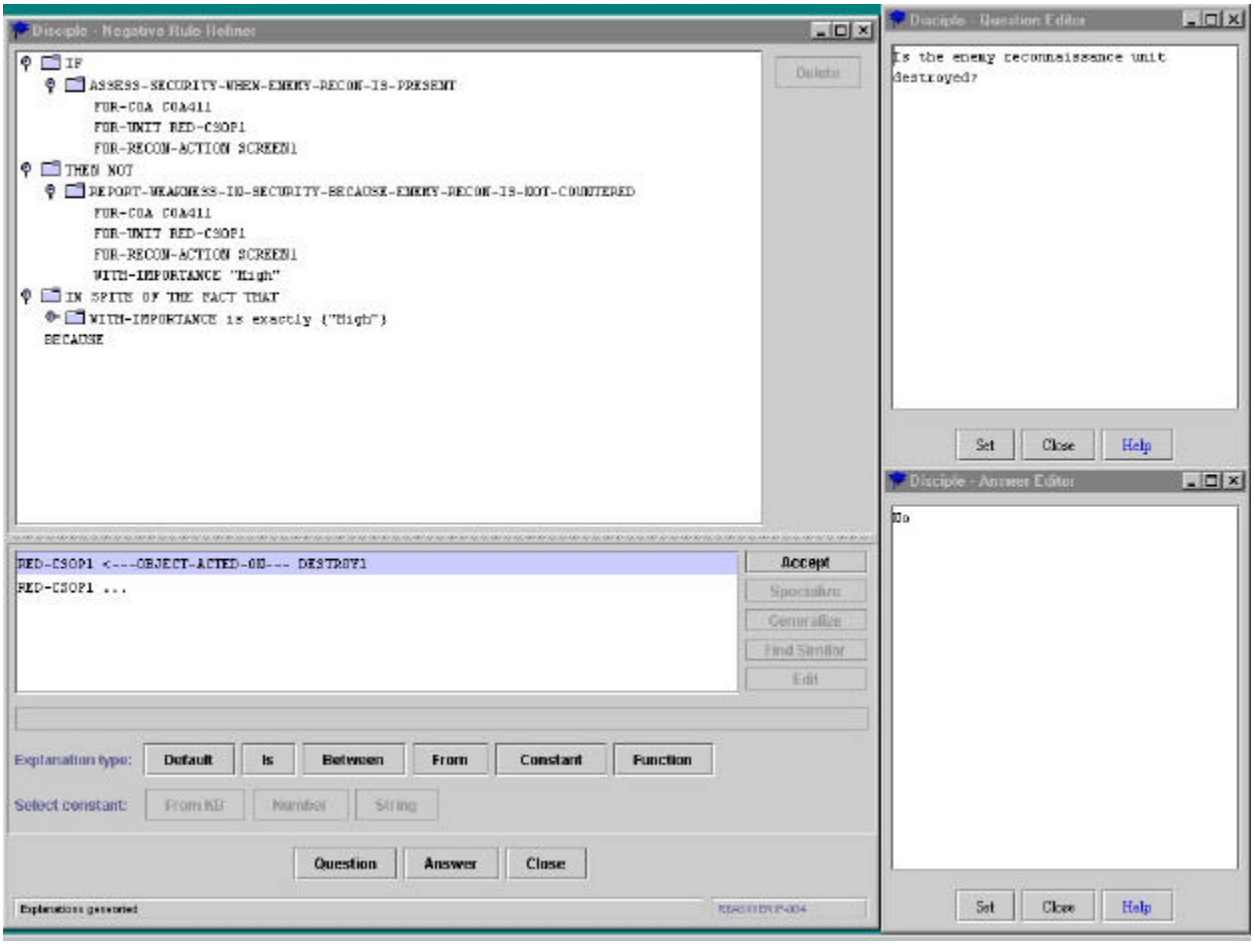
Obviously these two reductions are contradictory to one another. The second one (Report-weakness-in-security-because-enemy-recon-is-not-countered) is wrong.

Select it and then click on “Incorrect solution”.

Chapter

13

Interacting with the Rule Refiner



In the bottom pane of the "Negative Rule Refiner" window Disciple proposes explanations of the wrong reduction.

Click on:

RED-CSOP1 ✍ OBJECT-ACTED-ON – DESTROY1

Then click on “Accept.”

Indeed, one should not report a weakness because DESTROY1 actually acts on RED-CSOP1.

You also need to tell Disciple that DESTROY1 is a “destroy” action.

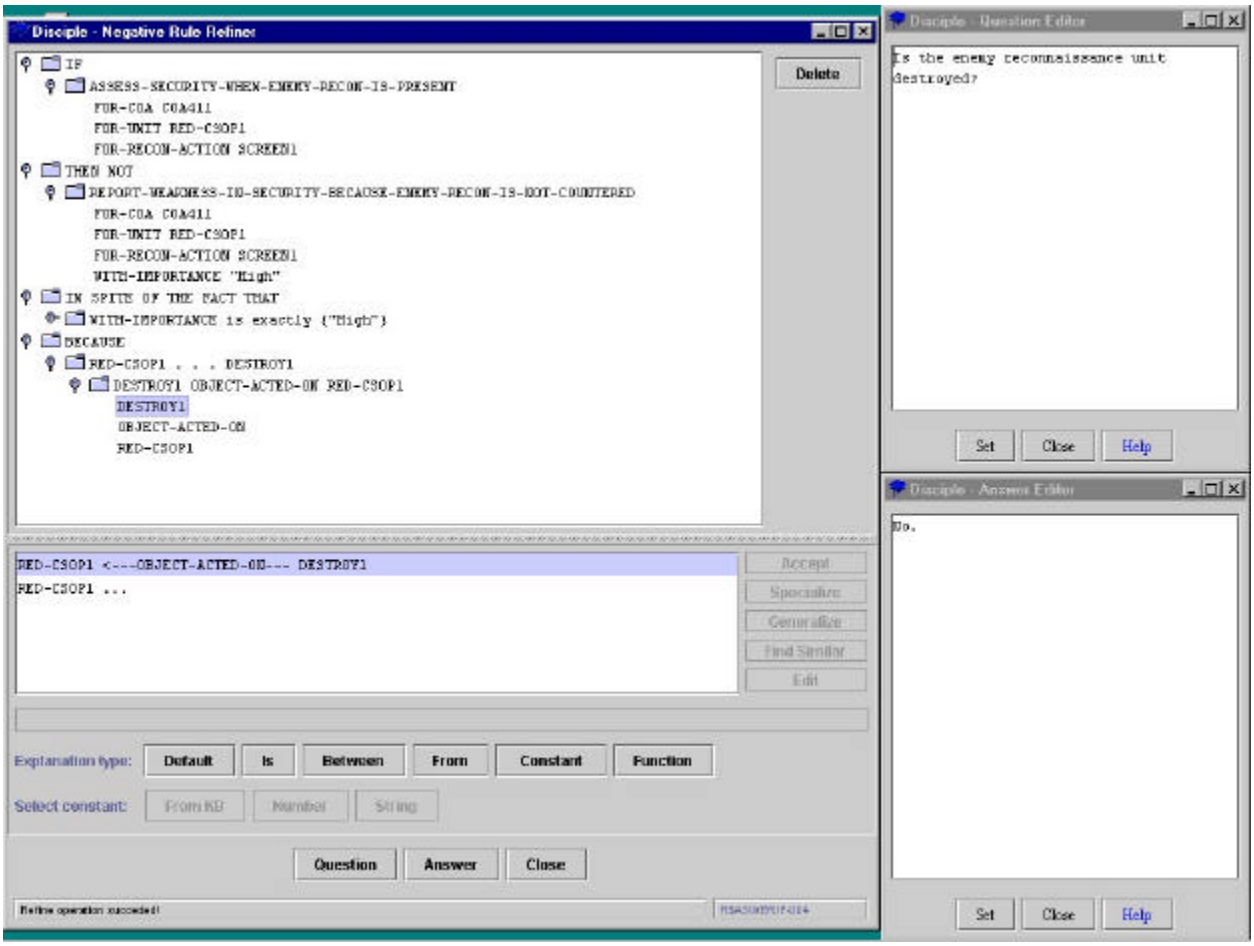
You can do this by providing Disciple a hint of type “Is” and pointing to “DESTROY1”.

Double-click on the explanation:

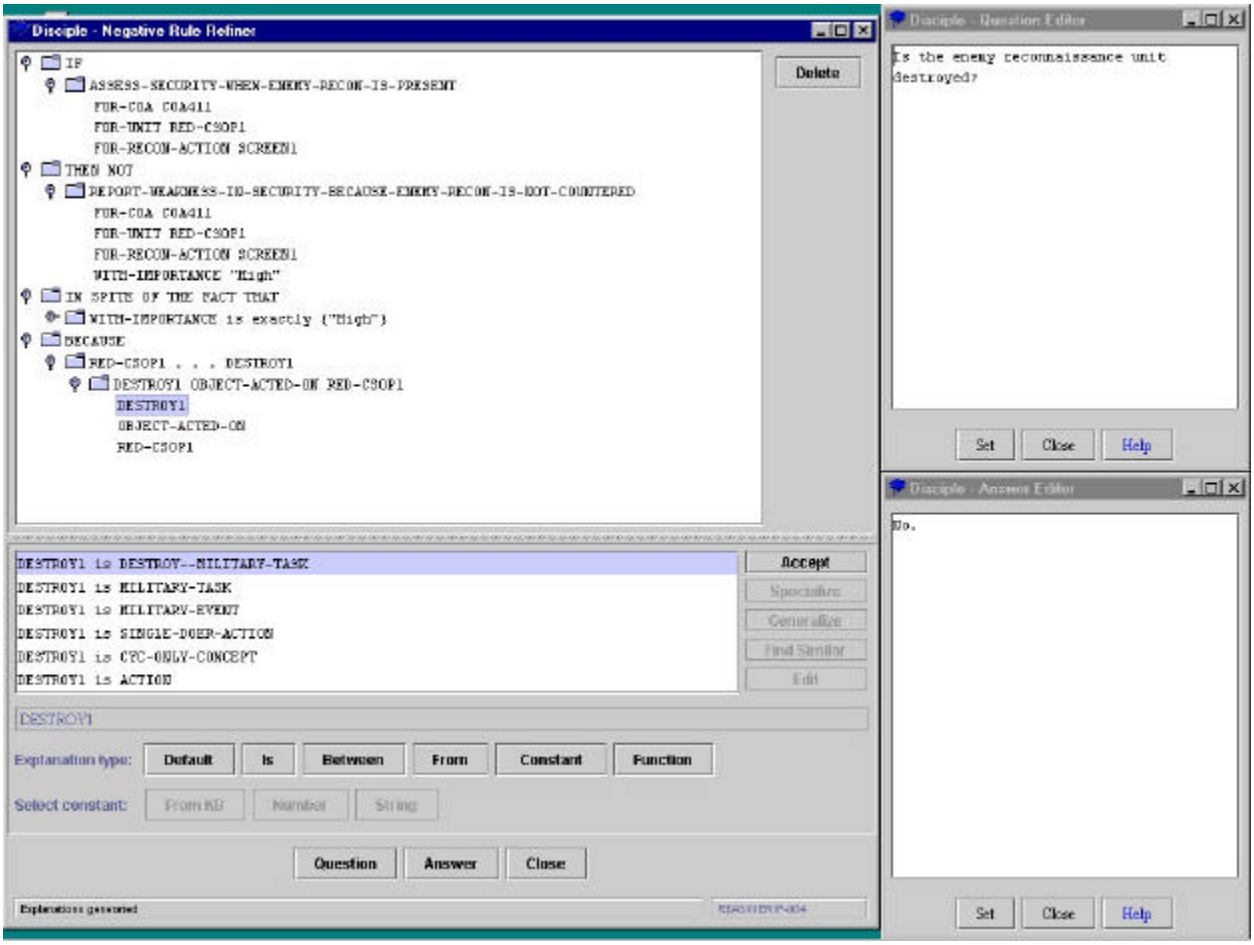
RED-CSOP1 … DESTROY1

in the top pane.

Then double-click again on the expanded explanation. Now “DESTROY1” appears on a separate line and can be pointed to, as part of an “Is” hint.



Click on the “Is” hint. Then click on “Destroy1” in the top pane.

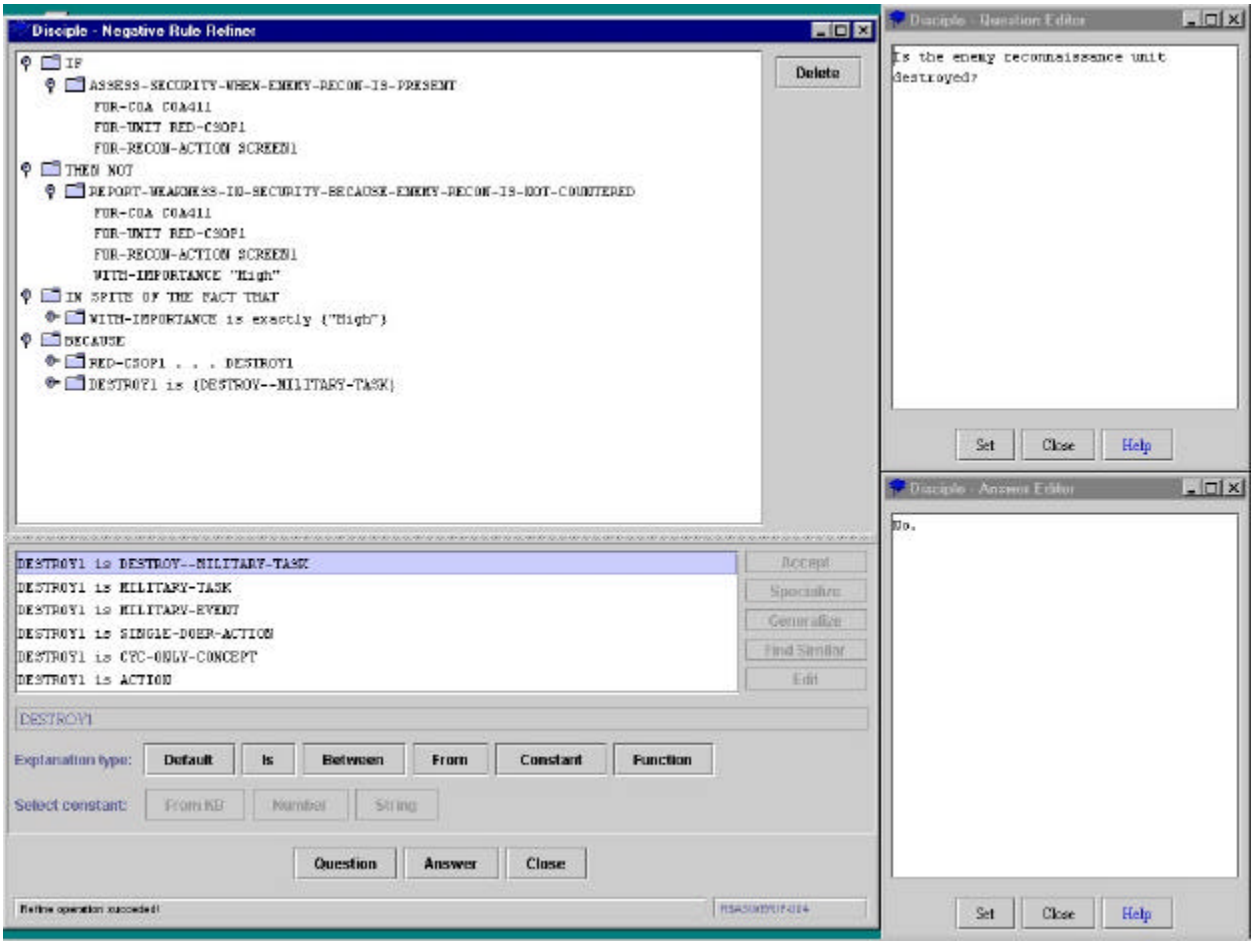


The bottom pane shows the various explanations of type “Is” for “DESTROY1”.

Select the first one:

“DESTROY1 is DESTROY--MILITARY-TASK”

Then click on “Accept”.



These are all the failure explanations necessary for this wrong reduction.

Click on “Close”. Disciple will refine the rule so that it no longer covers the above wrong reduction. Then Disciple returns to the Cooperative Problem Solver.

You see that now there is only one reduction proposed for the task:

“ASSESS-SECURITY-WHEN-ENEMY-RECON-IS-PRESENT”

This is the correct reduction.

The incorrect reduction is no longer proposed by Disciple.

You can continue the problem solving process if you wish, until you find a solution to the top level task. However, there is nothing else to be learned in this problem solving session.

Chapter

14

Loading a Problem Description into the Knowledge Base

To illustrate another case of rule refinement let us consider another coa, coa51.

In the "Cooperative Problem Solving" window click on the "Close" button, and then confirm that you want to close the Cooperative Problem Solver.

In the Disciple Client window click on "Agent/Load instances". The "Select Instances" window will be displayed. Click on coa51 and then on "Select".

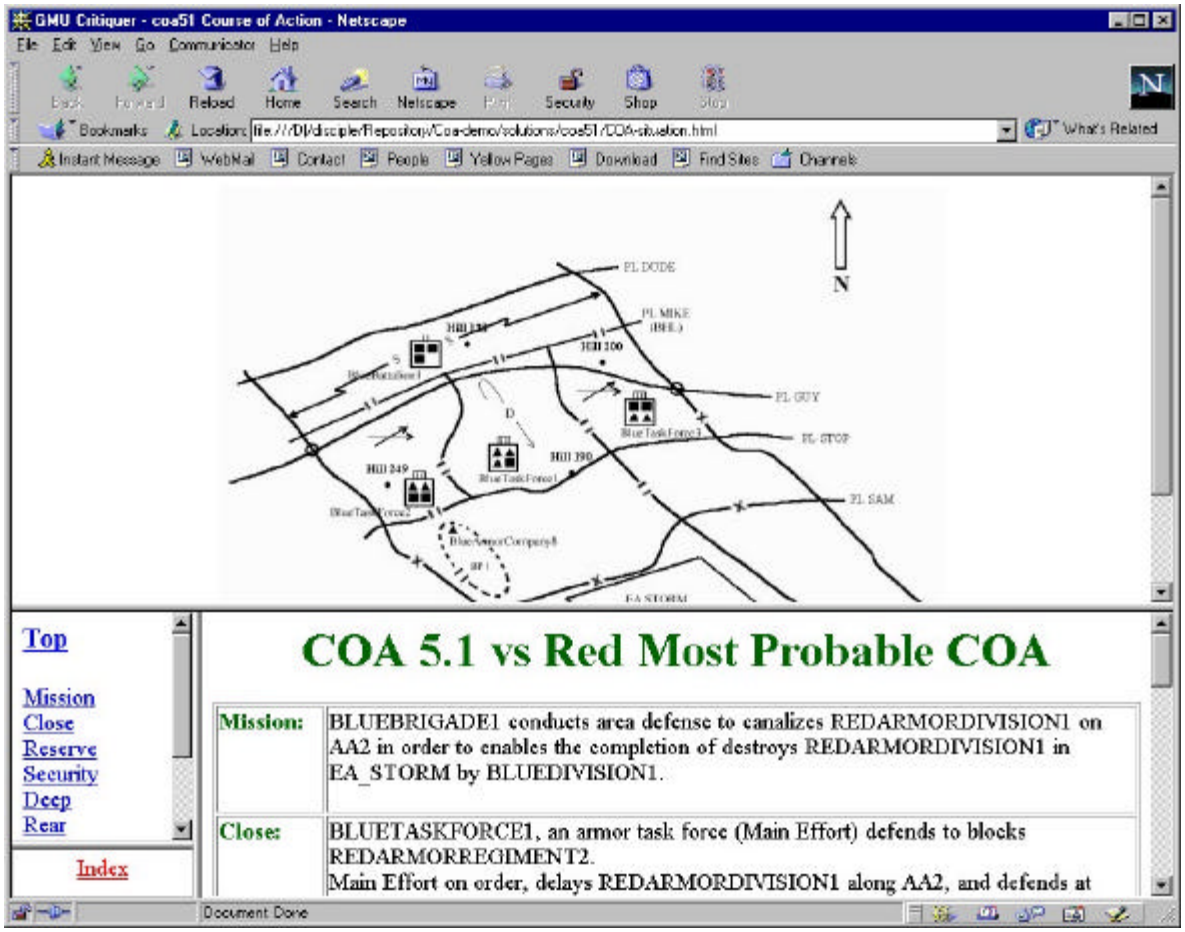
At this point, the instances corresponding to coa411 have been deleted from the KB and those corresponding to coa51 have been loaded.

Chapter

15

Viewing the Input Problem

To view coa51 use the "Disciple Client" window and from the "Solutions" menu select "Input Problem Viewer". An Internet Explorer window will appear that contains the description of coa51. As in the case of the previous COAs, the description of coa51 contains two pieces of information, a sketch and a statement.


GMU Critiquer - coa51 Course of Action - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: file:///D|/disciple/Repository/Coa-demo/solutions/coa51/COA-situation.html
What's Related
Instant Message WebMail Contact People Yellow Pages Download Find Sites Channels
N
PL DODE
PL MIKE
HILL 100
PL GUY
PL STOP
HILL 390
HILL 349
PL SAM
Top
Mission
Close
Reserve
Security
Deep
Rear
Index
COA 5.1 vs Red Most Probable COA
Mission:
BLUEBRIGADE1 conducts area defense to canalizes REDARMORDIVISION1 on AA2 in order to enables the completion of destroys REDARMORDIVISION1 in EA_STORM by BLUEDIVISION1.
Close:
BLUETASKFORCE1, an armor task force (Main Effort) defends to blocks REDARMORREGIMENT2.
Main Effort on order, delays REDARMORDIVISION1 along AA2, and defends at
Document Done

Chapter

16

Interacting with the Cooperative Problem Solver to Critique coa51

Let us now invoke the Cooperative Problem Solver. In the Disciple Client window, from the "Tools" menu, select "Problem Solver". A window will appear that will allow us to select the problem we would like to solve. Select "List all" and Disciple will list all the 14 predefined problems, one for each principle or tenet.

In the displayed list click on "P$07-SECURITY" and then on the "Select" button. This will invoke the Cooperative problem solver with the predefined task:

"ASSESS-COA-WRT-PRINCIPLE-OF-SECURITY"

Immediately Disciple proposes a reduction of this task to the following task:

"ASSESS-SECURITY-WRT-COUNTERING-ENEMY-RECONNAISSANCE"

Click on it and then on "Select solution".

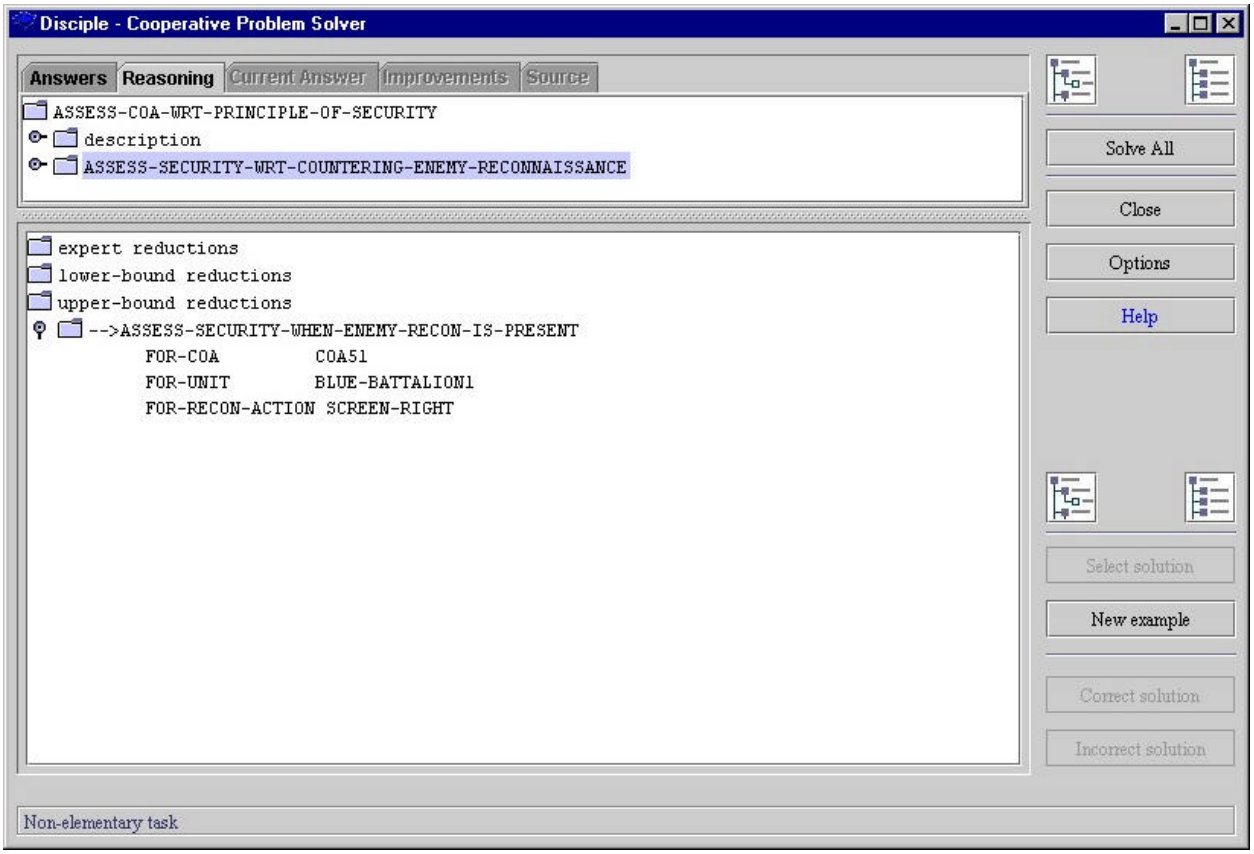
This reduction will be performed. Then Disciple proposes to reduce the task:

"ASSESS-SECURITY-WRT-COUNTERING-ENEMY-RECONNAISSANCE"

to the task:

"ASSESS-SECURITY-WHEN-ENEMY-RECON-IS-PRESENT".

To view the complete description of this task double-click on its name.



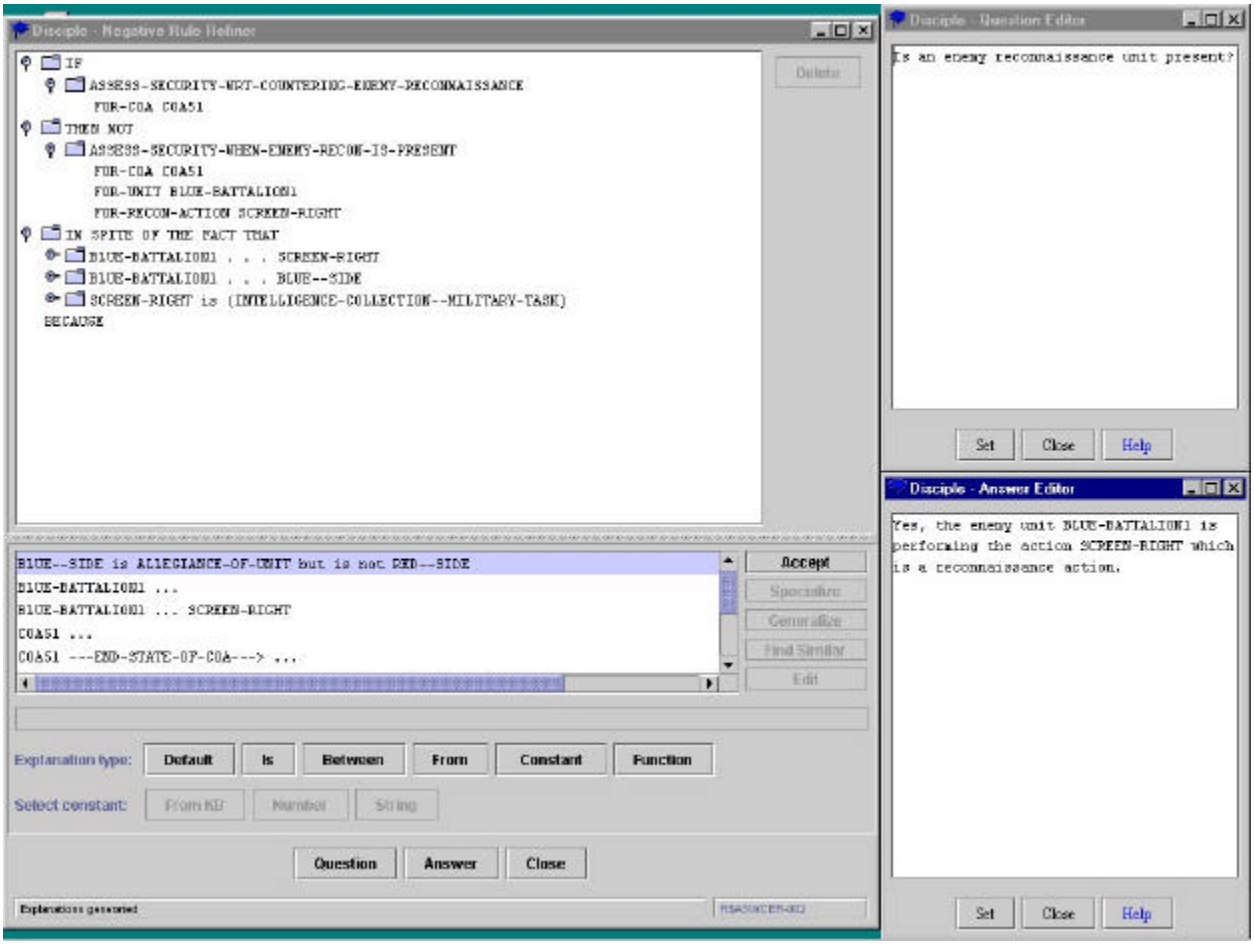
Notice that this is an upper bound reduction. This means that it is less certain, being based on a weaker form of plausible reasoning. It is, in fact, a wrong reduction. Click on “Incorrect solution”.

Chapter

17

Interacting with the Rule Refiner

The Rule Refiner is invoked, and windows similar to those corresponding to Rule Learner's windows are displayed.



The top pane of the "Negative Rule Refiner" window shows the negative example (i.e. the wrong reduction that Disciple has proposed).

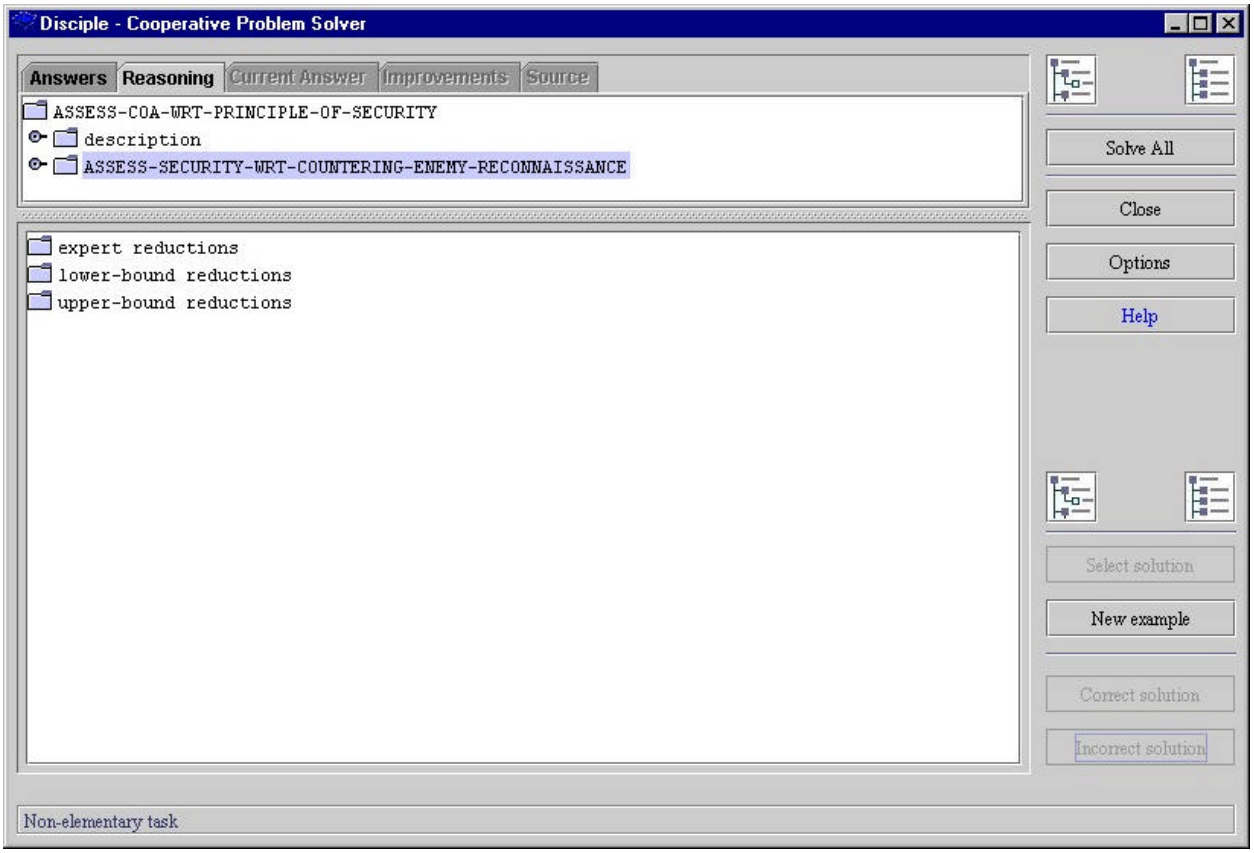
This reduction was proposed by Disciple because it is supported by explanation pieces that are similar with those of a correct reduction performed in the past (in the context of coa411). Indeed, there is a unit, BLUE-BATTALION1, which is performing an intelligence collection task and has some allegiance. The mistake made by Disciple is that it has not realized that allegiance to the blue side means, in fact, friendly unit, and not enemy unit.

Now that Disciple knows that this reduction is wrong, it proposes plausible explanations of this failure. The first explanation proposed is also the correct one:

"BLUE--SIDE is ALLEGIANCE-OF-UNIT but is not RED--SIDE"

With this explanation selected, click on "Accept".

Disciple refines the rule that generated this wrong example and returns to the Cooperative Problem Solver.



Because the rule was corrected, Disciple will no longer propose any reduction to the current problem. Indeed, there is no enemy recon present in coa51. Therefore coa51 does not exhibit any strength or weakness with respect to this aspect.

With this we have illustrated how Disciple can be taught to critique COAs with respect to the principle of security, taking into account enemy reconnaissance.

You have noticed that you did not need to work with the rules learned by Disciple. These rules are complex knowledge structure that could be viewed by using the Rule Editor.

Chapter

18

Interacting with the Hierarchy Browser

Let us view some of the rules you have taught Disciple, as well as some other elements from the KB, such as objects, features and tasks.

We will use the Hierarchy Browser for this purpose.

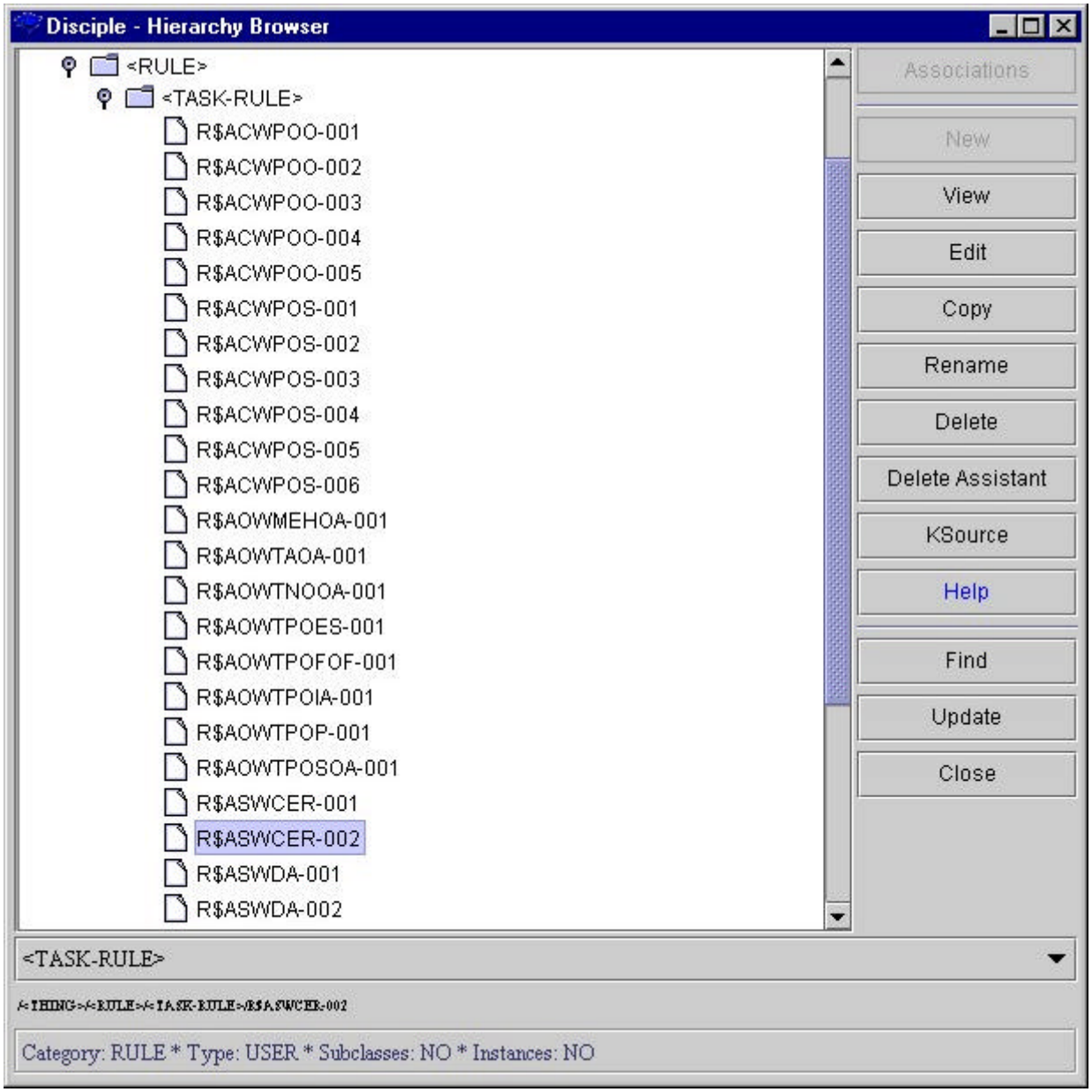
In the Disciple Client window click on "Tools / Hierarchy Browser".

In the displayed window you can see the top of Disciple's hierarchy.

Double-click on <RULE>. Then double-click on <TASK-RULE>.

Disciple will list all the rules from the KB.

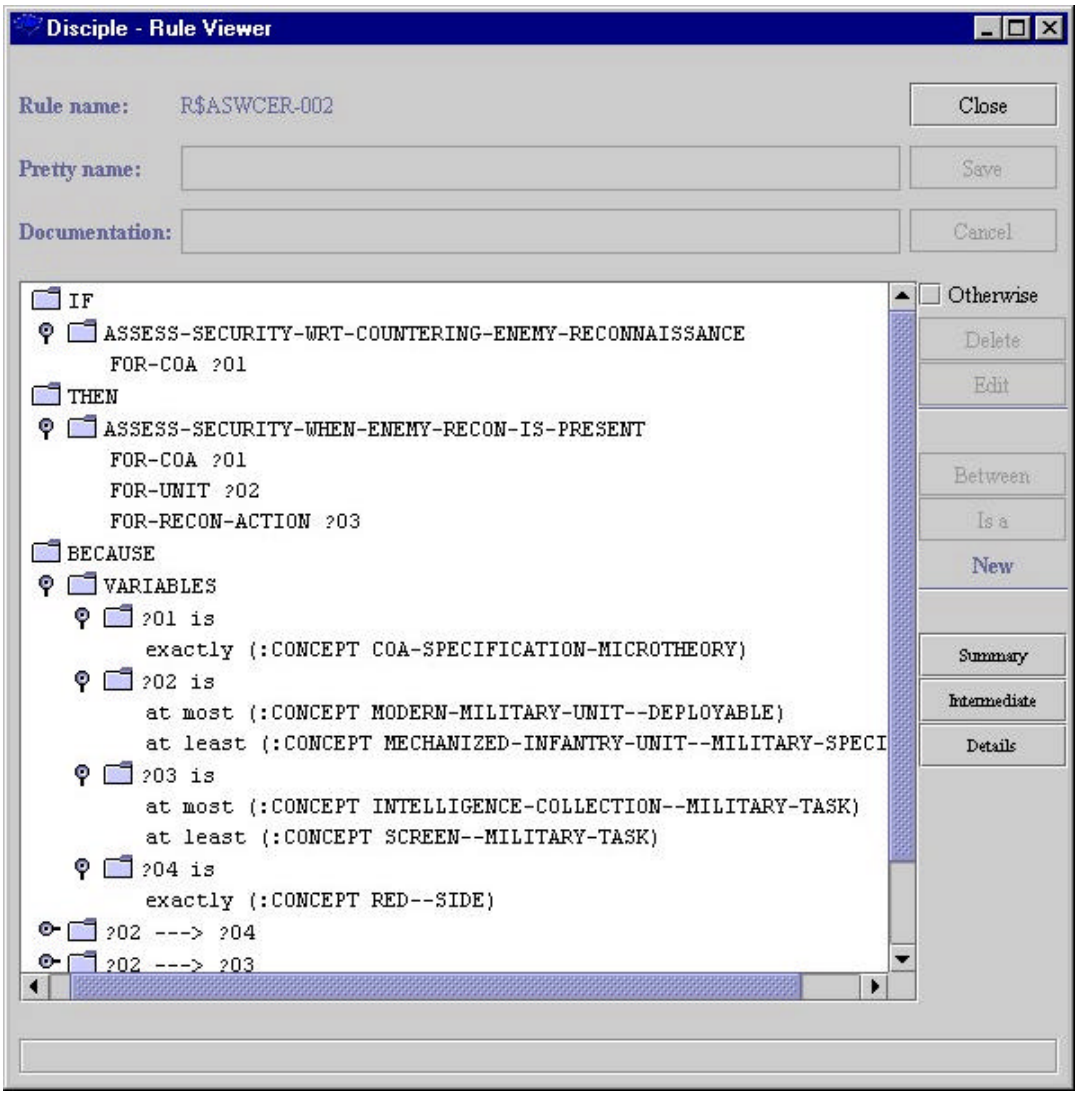
Click on R$ASWCER-002, then click on the "View" button.


Disciple - Hierarchy Browser
<RULE>
<TASK-RULE>
R$ACWPOO-001
R$ACWPOO-002
R$ACWPOO-003
R$ACWPOO-004
R$ACWPOO-005
R$ACWPOS-001
R$ACWPOS-002
R$ACWPOS-003
R$ACWPOS-004
R$ACWPOS-005
R$ACWPOS-006
R$AOWMEHOA-001
R$AOWTAOA-001
R$AOWTNOOA-001
R$AOWTPOES-001
R$AOWTPOFOF-001
R$AOWTPOIA-001
R$AOWTPOP-001
R$AOWTPOSOA-001
R$ASWCER-001
R$ASWCER-002
R$ASWDA-001
R$ASWDA-002
Associations
New
View
Edit
Copy
Rename
Delete
Delete Assistant
KSource
Help
Find
Update
Close
<TASK-RULE>
/<THING>/<RULE>/<TASK-RULE>/R$ASWCER-002
Category: RULE * Type: USER * Subclasses: NO * Instances: NO

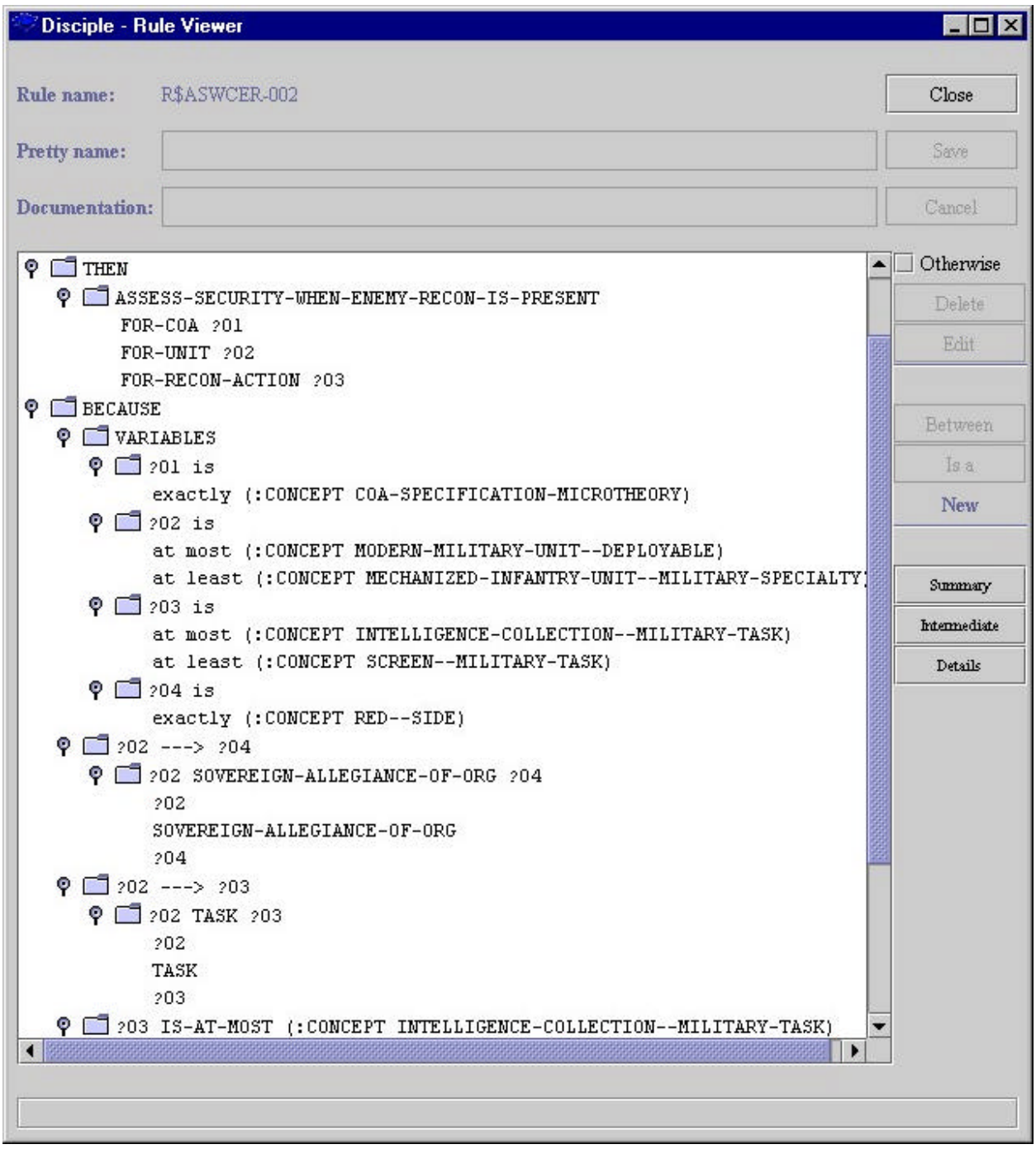
Chapter 19

Interacting with the Rule Viewer

The "Rule Viewer" window will display the rule.



Click on the “Details” button to see all the elements of the rule.

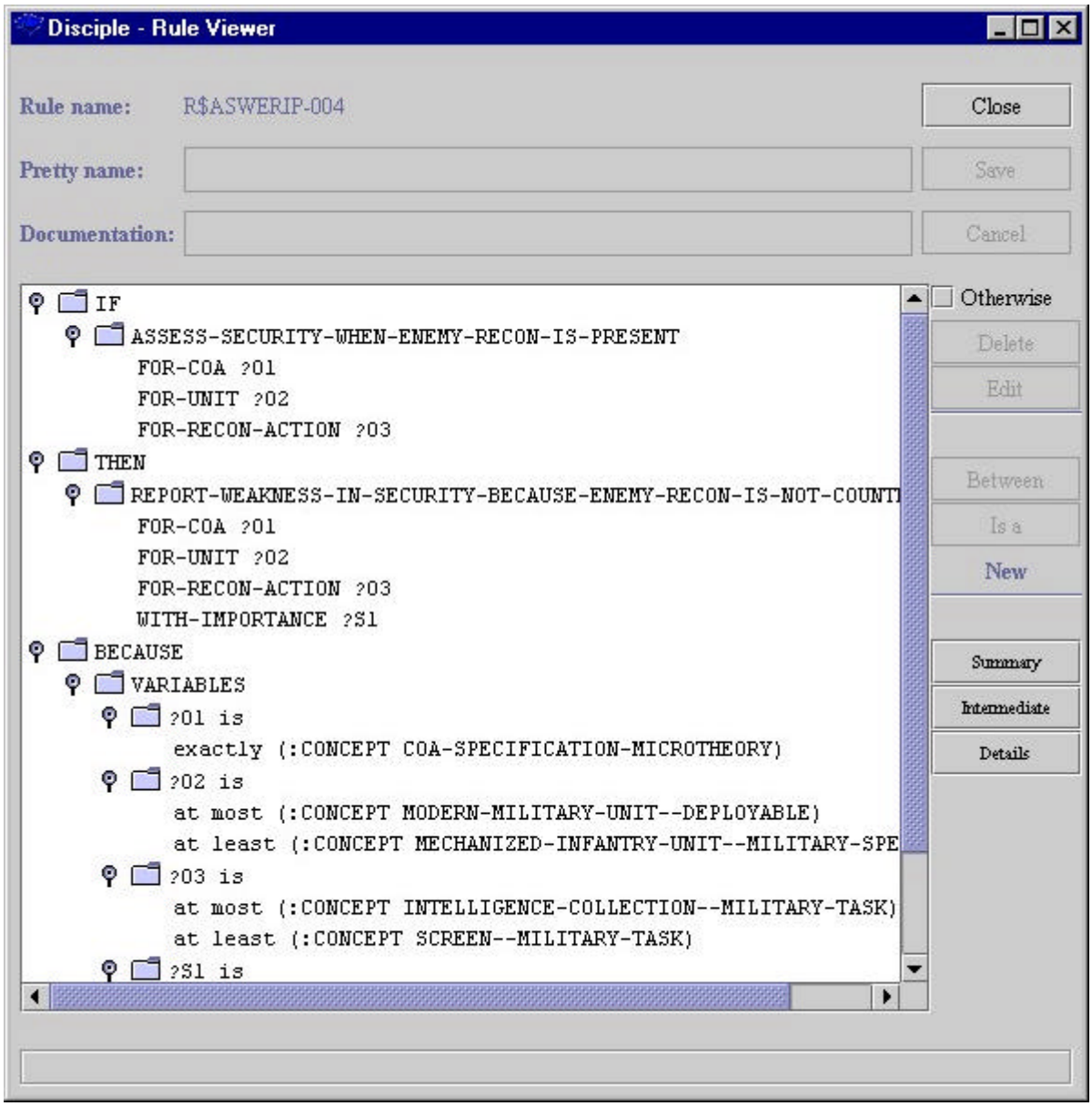


As you can see, this is a complex knowledge structure, but you do not need to work with it.

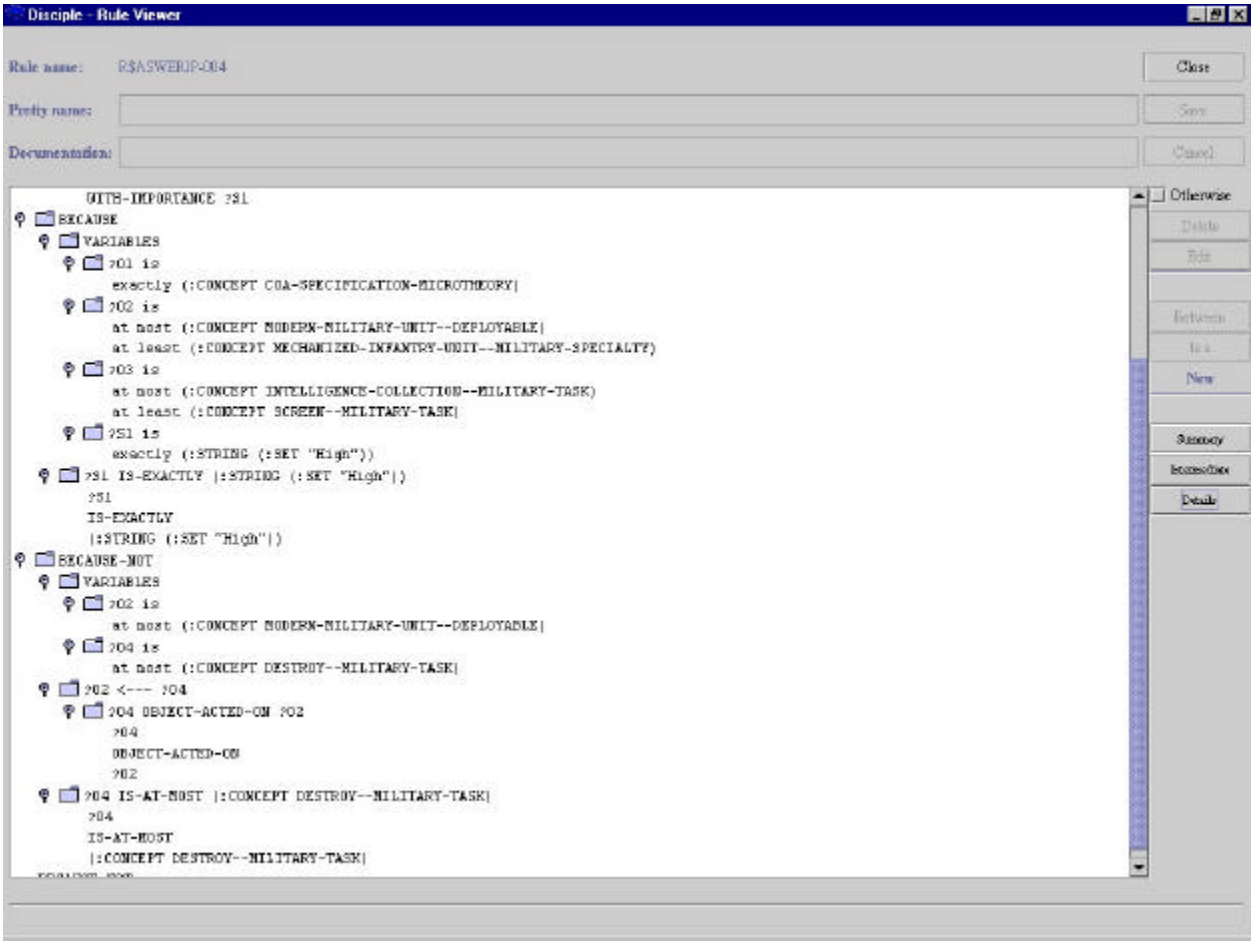
Now click on “Close”.

Let us view an even more complex rule that Disciple learned from you.

In the Hierarchy Browser window select “R$ASWERIP-004”. Then click on “View”.

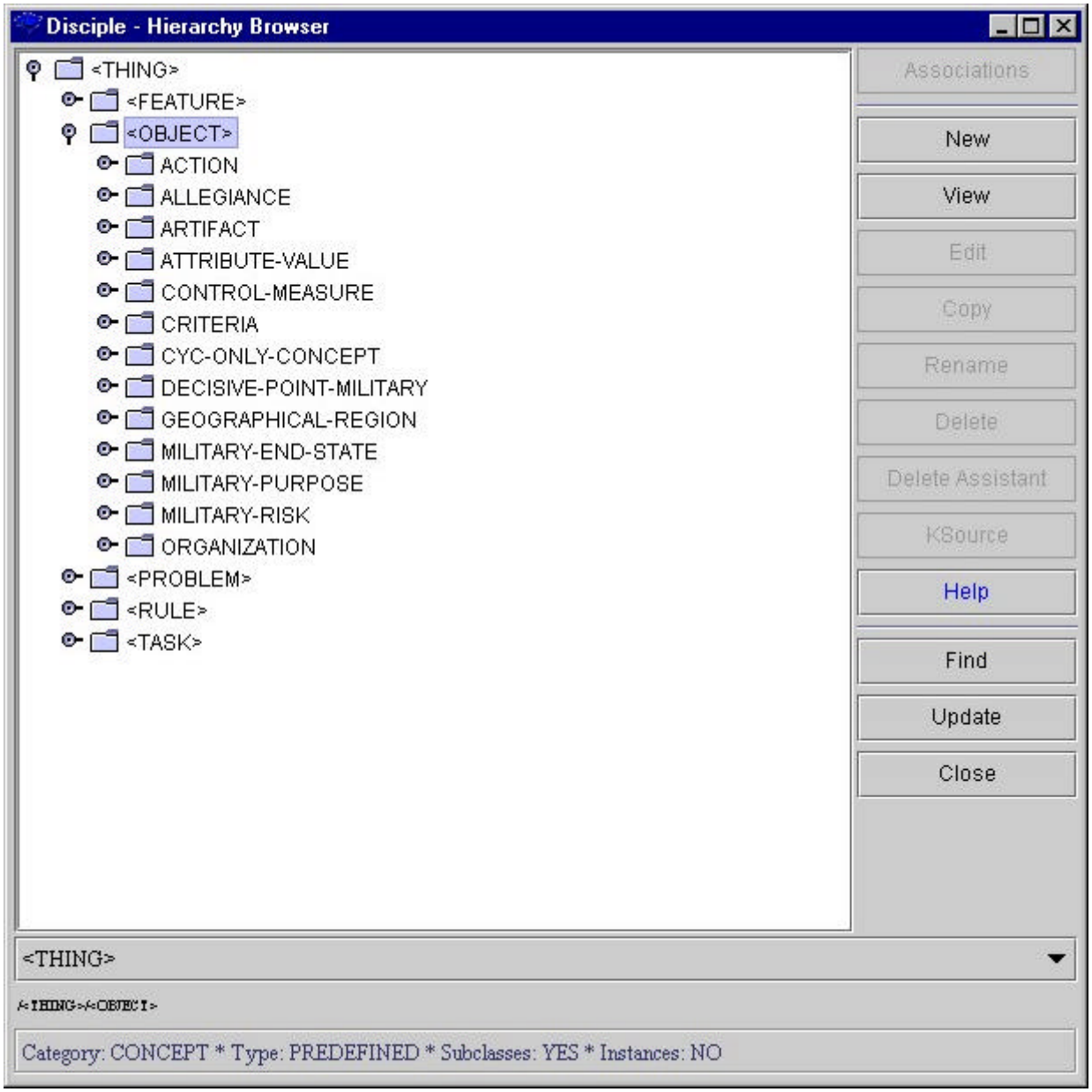


In the Rule Viewer window click on “Details” and then maximize the window.



Now click on “Close”.

To view the objects from the object hierarchy, double-click on <OBJECT>, in the Disciple Hierarchy Browser window. Disciple will display the top level objects from the KB.



Double-click on <ORGANIZATION>.

Then double-click on <MODERN-MILITARY-ORGANIZATION>.

Then double-click on <MODERN-MILITARY-UNIT-DEPLOYABLE>.

You can see the various sub-concepts of <MODERN-MILITARY-UNIT-DEPLOYABLE>.

Chapter

20

Searching for an Object into the Knowledge Base

You can search a specific concept or instance in the KB as follows.

Click on the "Find" button in the Hierarchy Browser window.

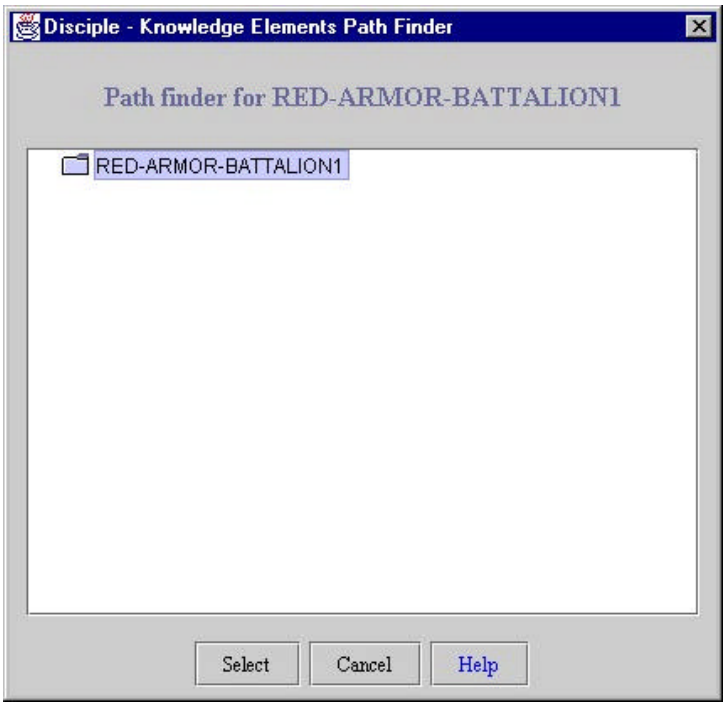
The familiar "Select a knowledge element" window will appear.

Click on "Start with letter" and then type the letter "r".

The window will show all the concepts and instances from the KB that start with the letter "r".

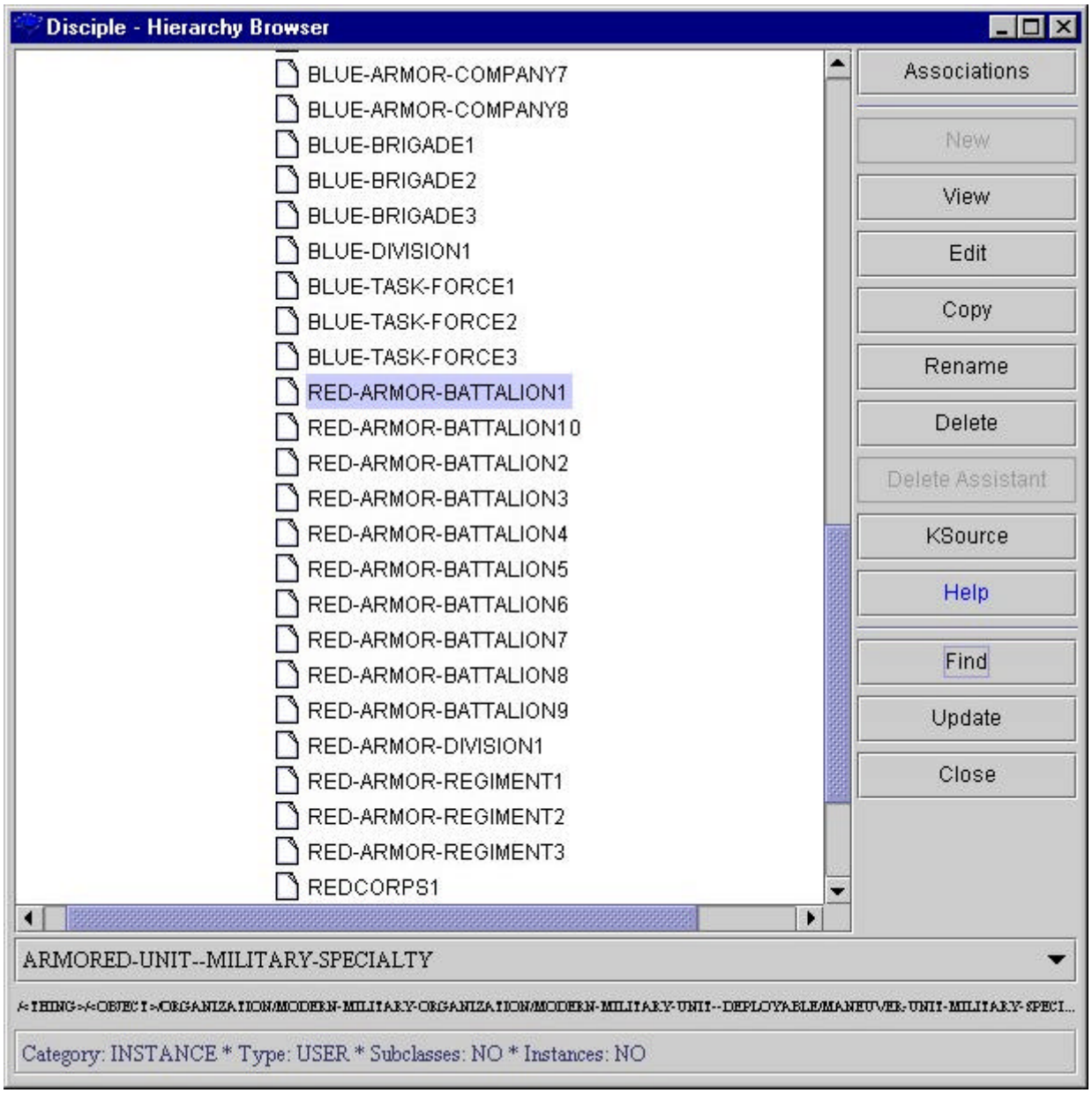
Click on "RED-ARMOR-BATALLION1" and then on "Select".

The "Knowledge element path finder" window will be displayed with the selected element.



Click on “Select”.

“RED-ARMOR-BATALLION1” is now selected in the Hierarchy Browser.



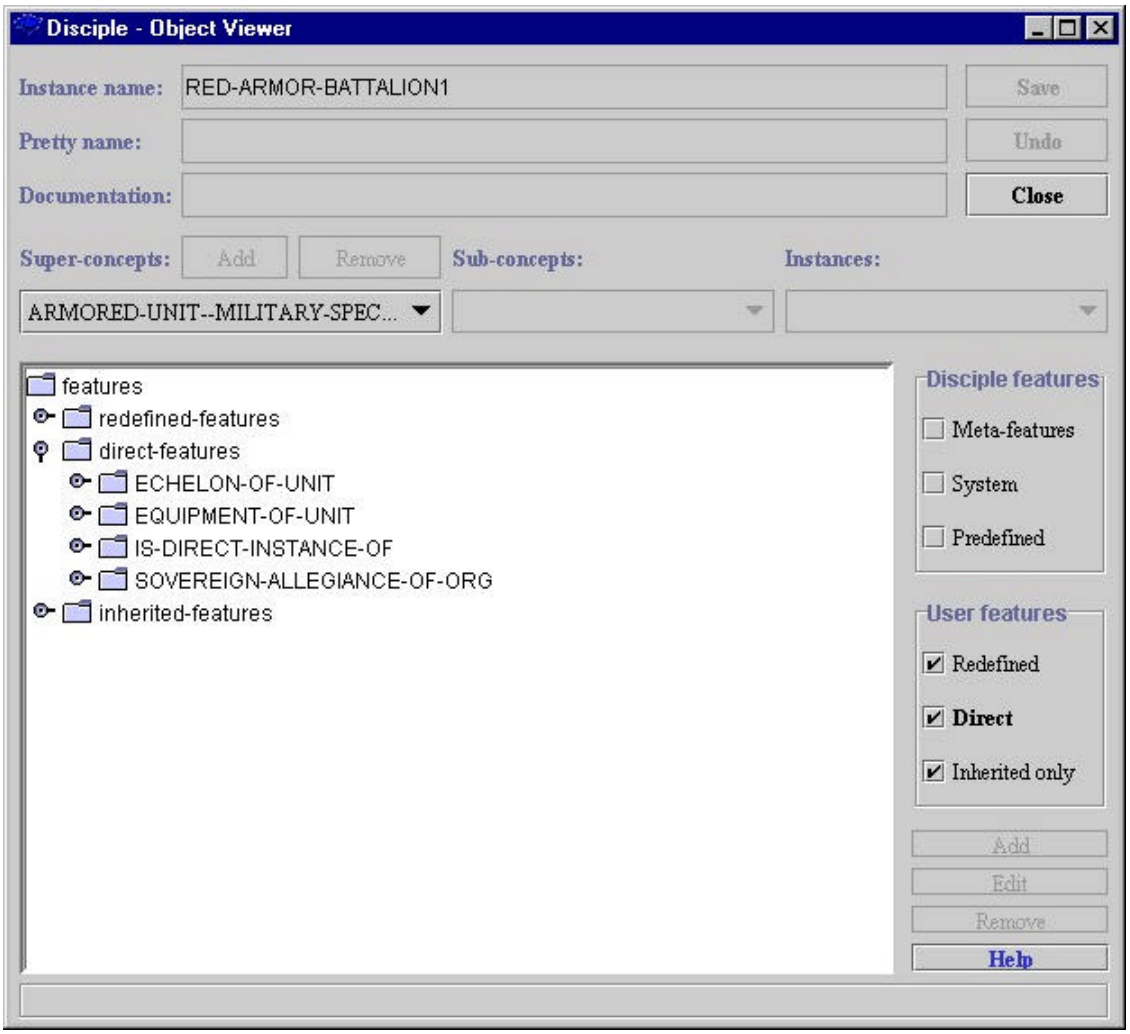
Click on “View” to see its description.

Chapter

21

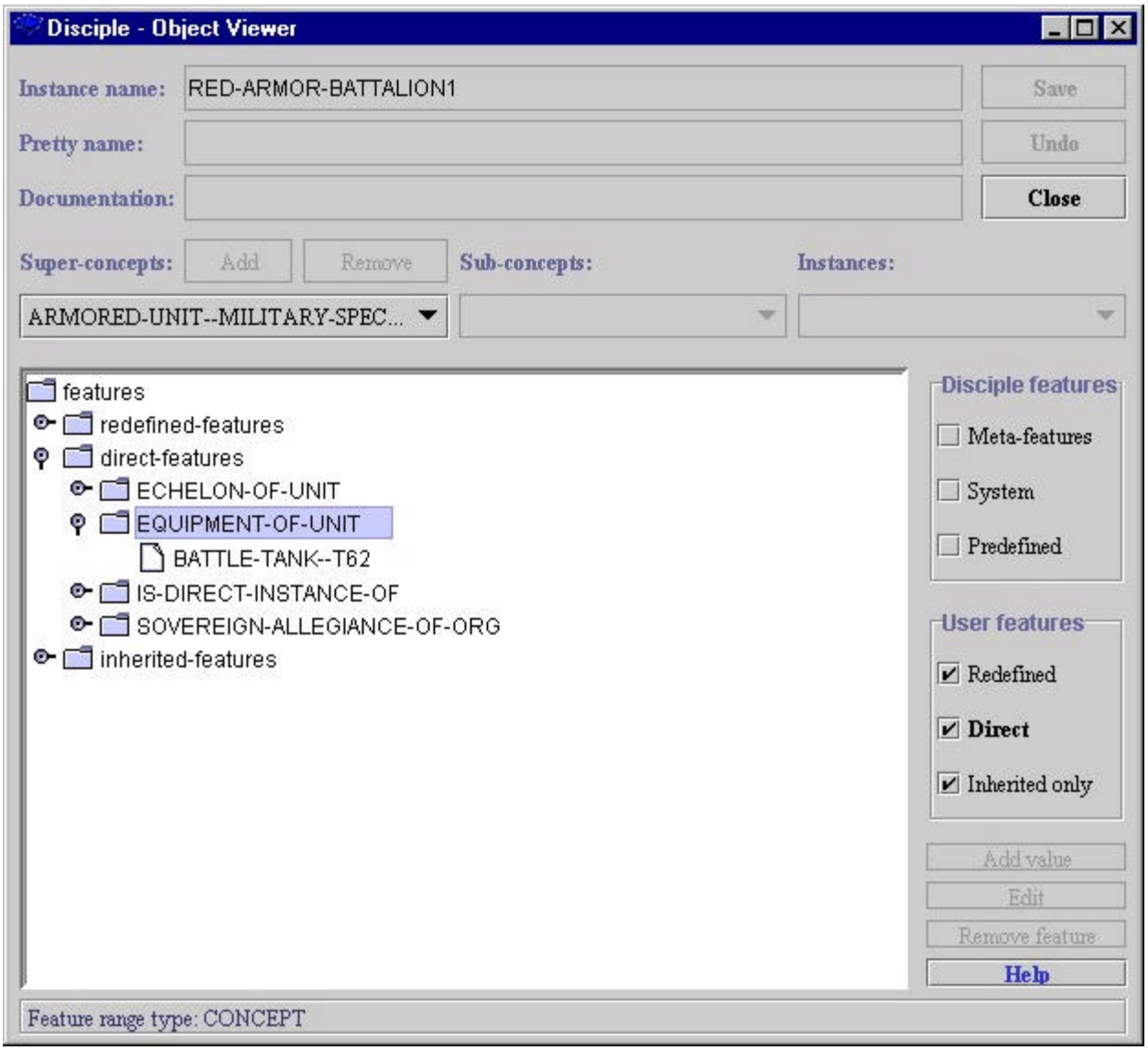
Interacting with the Object Viewer

The "Object Viewer" window is displayed, showing the features of "RED-ARMOR-BATALLION1".



The window will only show the features that are selected with the buttons in the right hand side of the window.

To view the value of a feature, double-click on its name. For instance, double-click on "EQUIPMENT-OF-UNIT".



The top part of the window shows also the super-concepts of the displayed concept.

Because we are using the "Object viewer", we cannot modify the object.

Click on "Close" to close the Object Viewer.

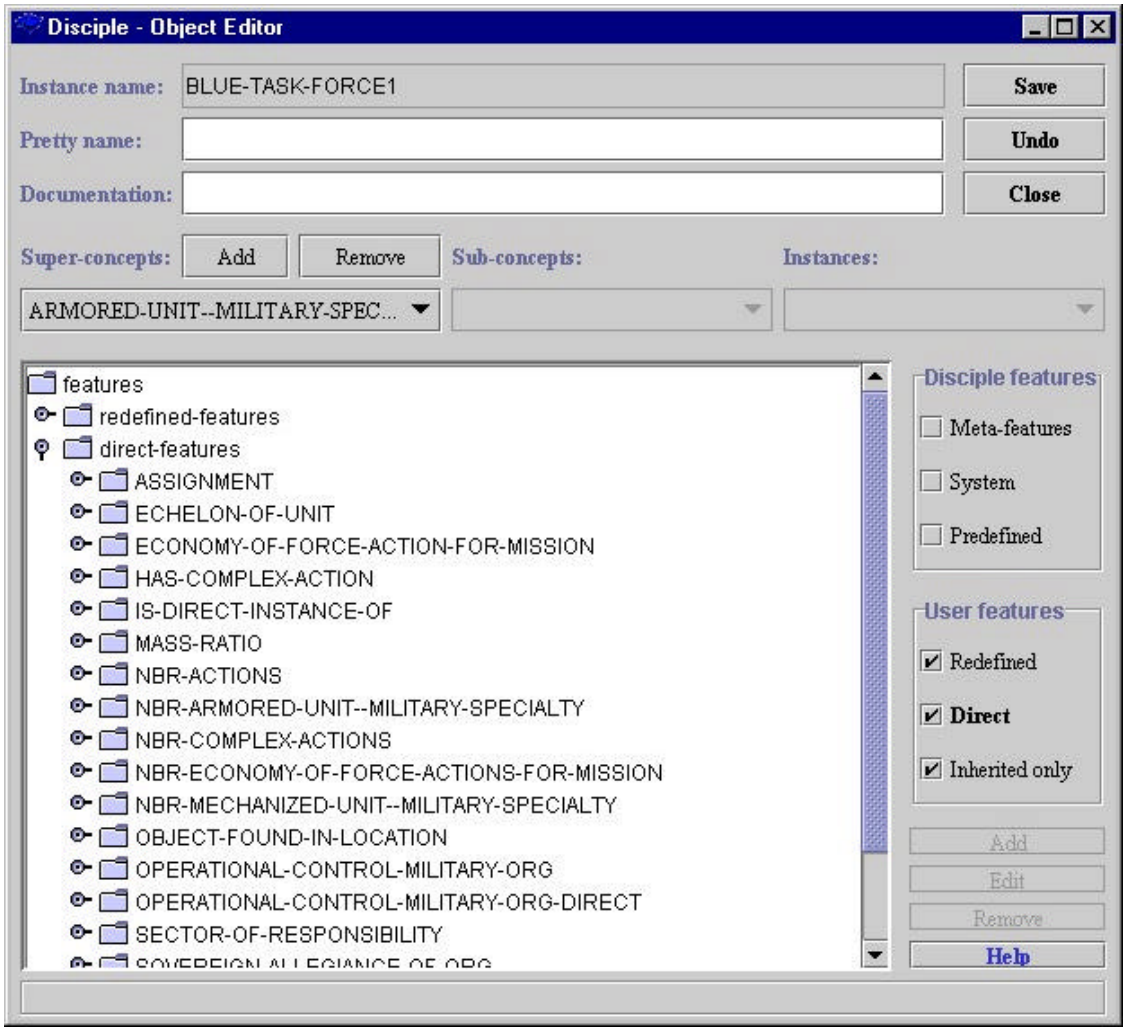
Chapter

22

Interacting with the Object Editor

If you want to modify an object you have to select the object in the Hierarchy Browser and then to click on “Edit”.

Select “BLUE-TASK-FORCE1” in the Hierarchy Browser. Then click on “Edit”.



Now you can Add, Edit or Remove features or their values.

You can also define a Pretty name and a documentation, by simply writing in the corresponding panes, at the top of the “Object Editor” window.

You can also Add or Remove super-concepts of the current instance.

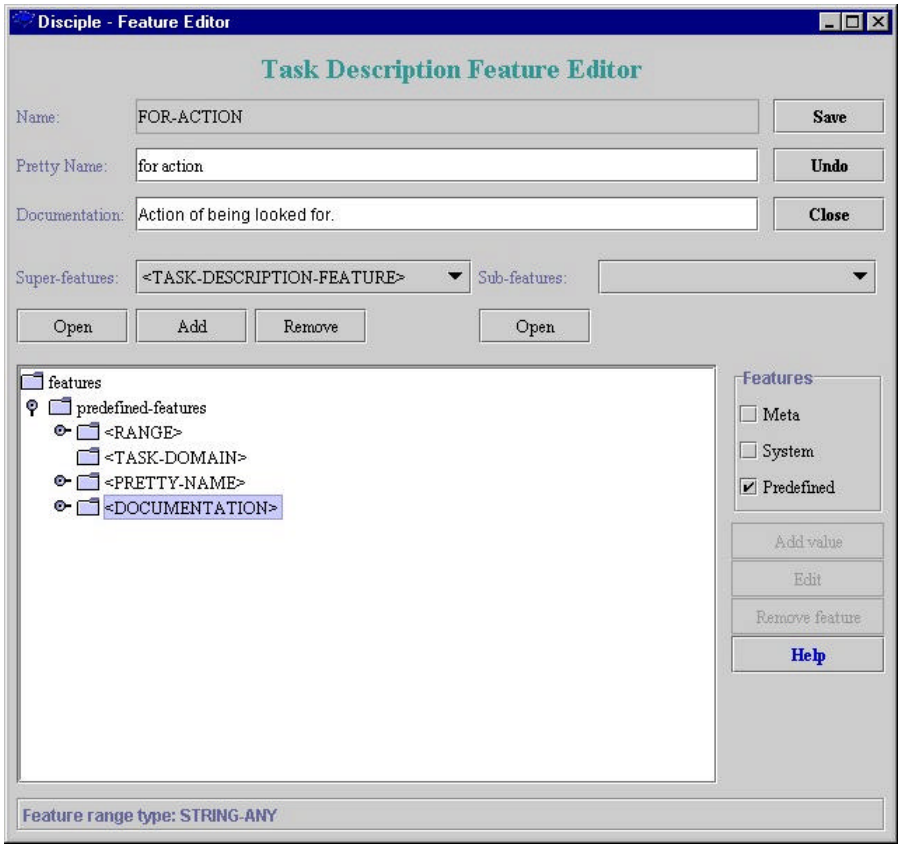
Click on “Close”.

Chapter

23

Interacting with the Feature Viewer/Editor and the Task Viewer/Editor

Using a similar procedure as the one described above, you can view or edit features and tasks. In each case a specialized viewer or editor will be invoked, once you have selected an element in the Hierarchy Browser and have clicked on "Edit" or on "View".



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